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THE ECOLOGICAL SUCCESSION OF BIRDS.

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"Of all truths relating to phenomena, the most valuable to us are those which relate to their order of succession. On a knowledge of these is founded every reasonable anticipation of future facts, and whatever power we possess of influencing those facts to our advantage."—JOHN STUART MILL.

"Indeed, some geologists seem to take pride in lack of knowledge of principles and of their failure to explain the facts observed in the terms of

the elementary sciences. I have heard a man say: 'I observe the facts as I find them, unprejudiced by any theory.' I regard this statement as not only condemning the work of the man, but the position as an impossible one. . . . The geologist must select the facts which he regards of sufficient note to record and describe. But such selection implies theories of their importance and significance. In a given case the problem is therefore reduced to selecting the facts for record, with a broad and deep comprehension of the principles involved, a definite understanding of the rules of the game, an appreciation of what is probable and what is not probable; or else making mere random observations. All agree that the latter alternative is worse than useless, and therefore the only training which can make a geologist safe, even in his observations, is to equip him with such a knowledge of the principles concerned as will make his observations of value."—PRESIDENT C. R. VAN HISE.

I. INTRODUCTION.

Almost every observer of animals has noted that certain kinds of birds are usually found associated in certain conditions, as, for example particular species of sandpipers and plovers upon the sandy beach, or the Meadowlark and Dickcissel upon certain prairies; but this is rarely considered a subject worthy of serious scientific study. To discuss the significance and value of such ecological study and suggest phases for investigation is the object of this paper. By the ecological distribution of birds is meant that correlation between environmental conditions and the occurrence and association of certain species of birds. In such study special attention must be devoted to the places of breeding; nevertheless the associations of birds at all seasons of the year are of importance. It is not the isolated occurrence of these species, but their relative abundance, the association of certain species, and their persistent occurrence in such conditions which is significant. In the literature of ornithology there is a vast amount of isolated data bearing on this subject, but very little of it has been organized and systematically studied.

When once the facts and general ecological relations have been determined, so that the representative bird associations or societies of given localities have been correlated with their proper environments, it will then be possible to determine how one society becomes transformed into another, whether this is due primarily to other birds,

or to other environmental influences. A knowledge of the succession of bird societies and of the laws of change will not only lead to new ideas as to the influence of the environment, but will also have a marked influence upon the practical field studies of the bird student. It should lead to a more intelligent understanding of the relation of birds to the world about them, or even better, to the world of which they form a part.

Attention should further be directed to the fact that simply the occurrence of the bird in a definite habitat is not by any means the sole aim of such work. The influence of the environment should be studied in its bearing upon all phases of bird life. Not only should the most favorable habitat or optimum be recognized, but also the influence of the less favorable conditions; thus the nesting site, composition of the nest material, food, abundance, feeding grounds, migrating habits and all like relations are needed for an adequate and exhaustive study of the ecological distribution and succession of birds.

It is therefore not surprising that such requirements will be difficult to meet because the facts themselves are difficult to secure. Then there are further difficulties which are due to the limitations of the student himself, and are psychological in their nature. As examples of this class of difficulties two may be cited, because they are of frequent occurrence in all kinds of scientific work and not by any means confined to the study of birds. For, contrary to our youthful ideas, naturalists have the same limitations as humanity in general! We may divide naturalists into two classes, depending upon their primary type of mind. First, those who tend to see only the infinite detail of isolated facts and observations. This type of mind is particularly impressed with the multiplicity and variety in nature, and is one to which a general statement is almost a cause of irritation because there are usually exceptions to any general statement. The constructive imagination seems feebly developed in this type. To this class belong many extremely valuable and useful students, because of the data which they, often with extreme conscientiousness, collect. They are collectors of facts rather than students of relations. To the second class belongs that type of mind whose primary interest is in generalizations, principles, relations, and which tends to neglect isolated facts and

observations. The constructive imagination is liable to be developed in this type. This includes many extremely valuable and useful students on account of their tendency to condense, sift and formulate great masses of isolated facts. They are students of ideas and relations rather than collectors of "facts."

Each class, especially the well-marked types and extremes, often finds it difficult or impossible to understand the point of view of the other class. This frequently leads to misunderstandings and often to mutual contempt. Cope and Marsh clearly illustrate these two types of minds among our American naturalists.

By this time some may wonder why this subject has been introduced. It has been with a definite purpose, because frequently these opposed points of view cause delays in the development of many subjects. Thus a forewarning to students of bird ecology may produce good results if the individual student makes a conscious effort to counterbalance such deficiencies as go with his particular type of mind. In the past, details have tended to produce confusion through the neglect of general ideas. It is rarely that a word of warning on this subject is out of place, because the balanced "golden mean" investigator is never too abundant. The quotations at the head of this article have an immediate bearing upon the subject at this point.

Not only is habitat preference, the association of avian species, their succession, and the laws expressing these relations of much interest, but they are of much importance scientifically as well as in a practical way. It is therefore desirable that naturalists realize the necessity of understanding the "rules of the game" if the true relations of birds are to be studied to the best advantage. No adequate substitute has yet been devised to replace a grasp of general principles.

Throughout this paper emphasis is placed on the *definiteness* of the dominant major environmental influences and complexes because the irregular features have apparently received undue emphasis and have retarded the recognition of certain important definite relations.

II. REPRESENTATIVE LITERATURE ON HABITATS AND SUCCESSION.

1. *Habitat Preference.* The American literature on habitat preference and succession, as a subject of special investigation, is very limited. By succession is meant the change or replacement at a given place of one or several species (an association) by others; as when a swamp is invaded by a dune and the representative swamp birds are replaced by those of the dune; or even again when the dune becomes fixed by vegetation and is inhabited by still another association of bird life. This is a much neglected subject; however, isolated observations on habitats are abundant in the biographies of the various species. The fragmentary character of these biographies tends to make them composite and they lose what peculiarities they may have which are due to a response on the part of the bird to its particular conditions of life. These unfortunate limitations clearly show that here is an extensive field worthy of careful investigation. The work already done will be a useful guide in many cases, but the student who wishes to develop this subject must turn to the fields and forests rather than to the literature, both for his inspiration and his data.

Perhaps a further word should be added concerning the limitations of the *composite* life-history method, as this will aid in making clear the kind of work needed in the future. This composite or generalized method of describing habitats and life histories and the response of birds to them, tends to lay undue emphasis upon the *average* conditions of life and habits, and tends to neglect those *detailed responses* to the environment which reflect the laws of local influence. These results are similar to those produced by systematic students who are "lumpers" and who do not recognize local races or varieties. Thus a nest may be built upon the ground at the base of a shrub or bunch of grass, or in the brush, but what conditions determine such sites? In a dry meadow a Song Sparrow may build directly upon the ground, but in a swamp, in order to have a dry nesting site, it builds in a willow shrub. In many cases the causes of these differences will be difficult to determine, but in others it is a relatively simple question for any one familiar with the species to solve. There are also geographic variations of habits

as well as those of habitats just cited, and for this reason it is necessary not to confuse such variations with those confined to some restricted area. These local and geographic relations are very intimately related, but they are subjects which can only be worked out in detail when local studies give proper attention to local environmental responses.

In the following account of the literature no attempt is made at completeness, but the papers cited are believed to be representative. These papers will help to give some idea of the kind of observations and records already made, and will be suggestive as to future work. Mention will first be made of the literature on habitat preference, and then of that on succession.

By far the best discussion we have found on habitat preference of the birds of a given region is that by Townsend ('05) on Essex County, Massachusetts. The primary avian environments are described, the representative birds listed, and their preferred habitats are briefly discussed. Thus, the ocean and its birds, the sand beach and its birds, the sand dunes and their birds, the salt marshes and their birds, and the fresh marshes and their birds, give a general idea of the subjects treated. Regarding the birds of the sand beaches, he remarks: "Among the Plover, the Black-bellied, Semipalmated, and Piping Plovers are above all birds of the beach, although the first two are occasionally found in the marshes, while the last-named rarely strays from the beach and the adjoining sand dunes. The Golden Plover, although at times found on the wet sands, is much more likely to hunt for food on the dry sands above the highest tides, or still farther inland, while the Killdeer generally avoids the beach altogether, preferring the fields" (p. 21). And regarding the birds of the sand dunes he remarks: "Savanna Sparrows nest in numbers at the foot of clumps of tall beach grass throughout the dunes, and on the edges of the tidal inlets from the marsh. The nests of the Red-winged Blackbirds and the Bronzed Grackles are abundant in the bogs and groves of the birches. The Crow, in the absence of tall trees, builds perforce in the stunted pines and birches, at times only ten or twelve feet from the ground" (p. 34). In the case of the Crow, note that he records the response to the dune environment.

While Townsend recognizes changes in the environment, as in the

dunes and beach (pp. 21, 30), yet he does not see their relation to the bird life in the definite way in which he sees their habitat preferences, nor does he appear to clearly recognize the fundamental relation of association within the breeding habitat. To him the environment is static. However an excellent feature of his work is the record of seasonal changes in the bird life of the various habitats. In this connection attention should be called to certain papers which will greatly aid in the study of the dynamics or changing environmental factors which influence sea or lake shores bordered by dunes and swamps; conditions represented on the Massachusetts coast. Gilbert ('85) has discussed the general principles and topographic features of lake shores; and Gulliver ('99) the shore line of the sea. But in addition to these physiographic forces, the vegetation also has a dominating influence upon bird life. For general principles relating to this subject Cowles ('01) should be consulted for his discussion of the vegetation of inland shores and dunes, and Ganong ('03 and '06) for his treatment of the Atlantic coastal conditions. These authors discuss the succession of the vegetation, a factor of the utmost importance in the study of avian succession.

While considering Townsend's results, it may be well to outline briefly a general succession of bird life along the shore as indicated by his records. It is evident from the map accompanying his volume that the currents and waves are constantly modifying the coast line and forming spits, bars and islands; and that the barrier beach area is increasing, and thus tending to become continuous at the expense of some of the ocean habitat. As the continuity of the beach develops, the area of swamp land behind it tends to increase and thus to further restrict the open water and increase the swamp habitat. The beach sands, once free from the waves or ground water, are caught up by the winds to form dunes, and may migrate into the swamps and thus transform them. Thus with the extension of the beach the sea birds are replaced in dominance by the shore birds, and a succession is produced.

In a similar manner the dunes encroach upon the swamp, and swamp birds are succeeded by those of the dunes. As the wandering dunes become anchored by vegetation and forests grow upon them, still other birds will invade them. Thus all stages may be expected,

from ocean to beach birds, onward to those characteristic of wandering and fixed forested dunes. These relations are outlined simply to indicate the problem and its causes, which need detailed investigation.

In Michigan a few habitat studies have been made. One in the Porcupine Mountains, on the south shore of Lake Superior, and another on Isle Royale. Both are by McCreary; the paper on the latter area is unpublished. The summer birds of the Porcupine Mountains are listed (McCreary '06) by selected localities and the habitat preferences are discussed as follows: water birds, birds frequenting the shores and banks of streams, birds frequenting grassy meadows and alders, birds frequenting tamarack and cedar swamps, birds frequenting hemlocks and maples, and birds frequenting the cliff and mountain top. In its emphasis upon habitat preference this paper is the only one so far seen which at all approaches Townsend's discussion of this subject. McCreary's work was done without a knowledge of Townsend's.

In southeastern Michigan, Brown ('06) made a locality study and outlines the habitats as follows: birds found in orchards, birds of the open woods, birds of the open fields, birds of the thicket, and birds of the marshes and river. Brown's paper is intermediate in character between the preceding papers and those of an economic nature, to be mentioned later, because the area studied has been so much influenced by man.

There are a few papers which, although primarily faunistic or geographic, contain habitat data. Such, for example, is Ridgway's ('74) discussion of the birds of the Wabash Valley and ('89) the birds of the Illinois prairie (pp. 13-16). An exceptionally good paper of this character on the Louisiana birds is by Beyer, Allison and Kopman ('06), although its aim and method of treatment differs from that of Townsend. The bird life is, however, closely correlated with the vegetation and the physical conditions of the State.

The papers previously mentioned have been written from a regional standpoint. The study however of all the various conditions frequented by a given species or some natural group is also an important and neglected method of ecological study which possesses certain important advantages. As an illustration of this method may be mentioned Palmer's ('00) study of the Maryland

Yellow-throat. He has shown that different varieties have different habitat preferences. Jacobs ('04) has given us an interesting habitat study of a single species in Pennsylvania, the Golden-winged Warbler.

Let us now turn to another class of habitat studies, those which through man's influence throw only a subordinate light upon "natural" habitats and succession, and are primarily of economic importance but contain valuable habitat data.

An interesting and rather unique paper belonging to this class, based on observations in Southeastern Michigan, is by Watkins ('00). It is entitled 'Michigan Birds that Nest in Open Meadows.' A few of his statements explain his point of view: "To make more plain the limit and scope of this treatise, which, of necessity must be longer than I hoped, I will include in my list only such species as I have found nesting upon the ground in the open fields and meadows, excluding those found nesting upon the boundary fences or ground; also those nesting in the open marsh lands which are undrained and boggy to the extent of being unfit for hay or pasture" (p. 67). The paper contains numerous notes on the habitat preference and variations in these traits.

By far the most comprehensive and thorough study of any limited farm area is that by Judd ('02) of a farm in Maryland. In this paper habitat preferences are clearly recognized, and discussed rather fully (pp. 12-20). The birds are associated thus:—birds that nest in open fields, birds that depend on covers, birds of less limited distribution (consists largely of remarks on haunts), and birds of varied distribution. His last two sections are rather miscellaneous in character and show that the principles of classification for habitats were not clearly defined in his own mind.

The only other paper discussing habitat preference in detail is also the latest upon the subject, and is by Forbes ('07). This is a preliminary report on a bird census across the corn belt of Central Illinois in the early autumn; a study of the feeding grounds and preferences as influenced by the dominant crops of the area traversed, corn, pasture, and stubble. By means of this census, the habitat preferences for different crops and the association of species in them is statistically determined. The paper is particularly suggestive for its bearing on the subject of dominance; however,

the suggested method of study has even greater significance when applied during the breeding season. Doubtless opinions will vary as to the validity of the method as applied by Forbes, even by those who would approve of it for the detailed study of a limited area, or a breeding habitat. For large areas some coöperative method may be necessary.

2. *Succession.* Turning now to the literature on succession, it is found to be extremely limited in amount. So far as known to the writer, only two American authors seem to have realized the existence of succession. In his discussion of the biotic succession in the Porcupine Mountains of Michigan, Ruthven ('06) clearly included the birds, although they did not receive separate treatment, and might for this reason be overlooked. His position is clearly stated (p. 43) as follows: "Owing to the dependence of forms of life on their environment, biotic changes are necessarily closely related to environmental changes. These biotic changes may occur in two ways; the forms must either be able to respond to the new conditions, or be supplemented by other forms. That they tend to become adjusted cannot be questioned, but in many cases at least, this adjustment lags behind the changing conditions, and the forms are replaced by others from adjacent habitats which are adjusted to the conditions toward which the particular habitat is changing, thus bringing about a succession of societies." In speaking of the biota of the hard-wood forest he further says: "This region has been reserved for the last, for the conditions are evidently those toward which the other habitats tend to be changed under the present conditions. . . . This society thus represents the climax society of the region. It consists of the forms that are adapted to or associated with the conditions which prevail in this region in the last stages of the mutual adjustment of all the environmental processes. As the processes become adjusted to one another, the habitat of the climax society is increased at the expense of the other habitats, and the associated biota tends to become of general geographic extent in the region."

The only other paper discussing avian succession is that by Frothingham ('06), and this is not a "natural" succession but one influenced primarily by man. He clearly expresses a bird succession correlated with the reforestation of burned lands. The area

studied is the Michigan forest reserve on Higgins Lake. The region was originally covered with White and Norway pine, but repeated fires first kill off the pines, later the oak and maple; and finally the dominant vegetation is sedge, sweet fern, huckleberry and prairie willow. With the fire protection afforded by the reserve, Frothingham anticipates a reversal of the above succession of destruction, and further remarks: "With the types of vegetation which mark the different stages of the plant succession just described there seem to be correlated certain definite bird forms. These forms are for the most part such as frequent observations in northern Michigan have identified as generally characteristic of the respective environments." This is followed by lists of birds characteristic of different kinds of vegetation. While these lists do not correlate perfectly with the implied succession, yet the general statement of the problem is clearly expressed.

The burning of forests has long been known to change the character of the vegetation and fauna of areas, but this is often referred to as the change of a "life zone." Thus Merriam ('99, p. 47) states that a fire in the Canadian zone on Mt. Shasta is followed by the Transition zone and remarks: "But in the meantime a new growth of Shasta firs has started, and in ten or twenty years is likely to overtop and drown out the Transition zone species, enabling the Canadian zone to reclaim the burn. . . . But on the steeper slopes, especially rock slopes, if the vegetable layer is burned off, the (lower) zone which creeps up to replace the (higher) one destroyed becomes permanent or nearly so. . . . Deforestation of an area therefore tends to lower its zone position." Birds are not mentioned in this discussion nor the relation of "zones" to the general problem of succession. Such "zones" are thus only particular phases of succession.

It is thus seen from the above outline of literature that habitat preferences have been outlined for a few widely separated localities and for some agricultural conditions, but there has been no comprehensive discussion of the problems of habitats and succession, even in a preliminary manner, either from a scientific or economic standpoint. This fact seems rather remarkable in view of the great utility of a knowledge of the general principles underlying economic practice. There are, however, certain phases of biotic

succession which have been discussed by a few authors. These subjects have either been discussed in a very general manner or are detailed discussions of special regions or groups of plants and animals. For this reason, perhaps, their bearing upon other groups than those specifically mentioned are very likely to be overlooked by those who take little interest in any subject or discussion which does not specifically mention their specialty or locality. This phase is mentioned in order to show that while avian successions have been considerably neglected, advances have been made elsewhere, by means of which some general principles appear to have been fairly well established. This is particularly true of plant succession, as shown by the writings of Cowles ('01), and in considerable detail by Clements ('05). The discussion by Clements will be particularly valuable to the student of avian succession.

III. THE MAJOR AVIAN ENVIRONMENTS.

As has been seen in the preceding review of the literature on haunts, no comprehensive discussion has been given of the environmental influences or ecological distribution of (extra-tropical) North American birds. Various authors have discussed their geographic distribution, and certain geographic variations have been referred to certain environmental influences, but a general ecologic treatment, as contrasted with a primarily faunistic one, has not been made. This is remarkable when we recall the fact that the collections of North American birds are, considering the large area concerned, the best in the world both as to quality and as to quantity (Stejneger, '03). This means that there have been many trained collectors; but what has become of the notes and observations on the environments and conditions of life of these birds, which must necessarily have been known to successful collectors? Part of these observations have been published, and perhaps no one is to blame because more have not; but the point of significance is that we have, in fact, hardly made a beginning in the careful detailed study of the bird environment and its development as a distinct field of study. In common with the remainder of the North American biota, several general principles are known, but they do not appear to be current among ornithologists.

The following discussion and suggestions on the larger environmental units attempt only an outline of certain phases of the problem, in order to call attention to certain principles which seem useful as a background for the intelligent study of bird habitats and succession. From such a standpoint as this, the *dominant* influences of given areas and environments are of particular interest and of fundamental value. By focussing attention upon the importance of recognizing these dominant environmental influences, we may hope to escape some of the confusion which appals those who are keenly impressed with the chaos and complexity of the problem. These dominant factors are usually not single isolated forces, but resultants of several or many influences. Thus, as in the case of the vegetation, it is not one factor, but a complex, which influences different birds in different ways. Nevertheless there is what may be called a mass or dominant effect.

A major habitat unit may be considered as a combination of conditions which are dominant in a certain area. *The very dominance means that a relatively limited number of forces or complexes are operative.* With departure from such a center of influence the dominance changes, as other influences are encountered and other dominants are established.

When we consider that certain ecological groups of birds are world-wide in their environmental relations, it becomes evident that such characters are of fundamental importance. Thus water birds may occur in any part of the world where water is a dominant environmental factor. This is not a simple ecological group of birds, but one of the greater units of association which may be subdivided into many minor classes; as those which frequent the sea, and others the inland bodies of water. The shore birds form another natural ecological group, and also the inland birds a third. There may thus be considered to be three primary ecological groups of birds which are closely correlated with definite and dominant environmental influences; thus:—

1. Water birds.

Those frequenting the sea and the adjacent rocks on which they nest, and inland waters.

2. Shore and Marsh birds.

Those frequenting shores of all kinds, seas, lakes, swamps and rivers.

3. Inland birds.

Those frequenting deserts, grass lands and forests.

Of course these ecological classes are not sharply defined, and yet they are so distinct that they can be easily recognized. It should be noted that the above groups are closely correlated with certain dominant physical features of the earth — the sea, the shore and the inland environments.

The relative abundance and dominance of these classes of birds will be determined largely by the dominance of such physical conditions as most distinctly favor a particular ecological group. Thus at sea the water birds are dominant; on shore, the shore birds; and inland, still other kinds. The linear character of the shore habitat and the adjacent breeding grounds gives it a rather unique character, as the two other habitats occupy large expanses. However, the swampy, somewhat shore-like conditions of the far north most nearly approach, for the shore birds, the expansive character so usual for water bodies and inland areas.

In the present discussion the emphasis placed upon the inland vegetation does not mean that the dominance of other influences is not recognized, but simply that it makes a convenient and fairly reliable *index to many other environmental influences*, as, for example, the climate and topography. A further important advantage of the plant index is that the science of plant ecology and many of its general principles and methods are applicable to birds. A general knowledge of plant ecology is therefore becoming one of the most valuable tools in the hands of the field ornithologist. Every field naturalist has observed the general correlation of certain birds with certain kinds of vegetation. This relation is clearly expressed by Ridgway ('89, p. 8) as follows: "There is probably no better index or key to the distribution of birds in any country than that afforded by the character of the vegetation; should this vary essentially within a given area, a corresponding difference in the bird-life is a certainty." This phase of the subject clearly illustrates the oft-repeated experience of naturalists that in order to thoroughly understand one subject — perhaps the favorite one — it becomes necessary to study another, or even several. Thus in order to know the bird life of a region it has become necessary to study the ecological relations of its vegetation.

The study of ecological plant geography is an extensive one, but many of the details, so important to the botanist, are of much less concern to the ornithologist, who needs primarily to know the major plant associations or formations and their successional relations. This implies ability to recognize dominance among plant species and the general method of transformation from the dominance of one to that of another.

By a plant formation is meant that association of species (or plant society) which is correlated with those conditions which tend to prevail over a large geographic area in the last stages of mutual adjustment of all environmental and biotic processes. Such an association or formation tends to occupy such an area to the exclusion of all others, and is thus a climax society.

But absolute dominance of a formation does not occur, because local conditions break the monotony where streams, water basins, bare rock, and similar influences may interrupt the desert, grassland or forest, and produce minor habitats and associations of both plants and animals.

It is not my purpose to discuss in detail the various plant formations of (extra-tropical) North America, but to outline those which are of evident ornithological utility. The following may be recognized provisionally:—

1. The Arid Deserts of Southwestern U. S. and the Mexican Plateau.
2. The Grasslands of the Great Plains.
3. The Deciduous Hardwood Forest of Southeastern U. S.
4. The Coniferous Forests of Eastern Canada.
5. The Giant Conifer Forest of the Pacific Coast and the Rocky Mountains.
6. The Barren Grounds or Cold Desert.
7. The Alpine Deserts.

A mere inspection of this list of avian and vegetational formations shows that the recognition of these large environments is relatively simple. It is also seen that they represent fairly definite physical or environmental complexes of such fundamental importance that there can be no doubt as to their general validity. As to the relative value, influence, boundaries, and the dynamic relations of these formations, much is already known, but not as an organized body of facts and principles. It will also be noted that these regions do

not closely correspond with current faunal areas, although there is a very close correlation in some cases. An avian formation may, in general terms, be considered the analogue of a vegetational formation, although this does not imply that they necessarily have the same boundaries.

As the literature treating of the vegetation of these areas is extensive and scattered, a few papers will be cited as an index to others:—

1. Arid Deserts; Bray, '06; Coville and MacDougal, '03.
2. Grasslands or Plains; Clements, '05; Pound and Clements, '00.
3. Southeastern Hardwoods; Cowles, '01; Harper, '06; Transeau, '05.
4. Eastern Canadian Conifers; Whitford, '01; Transeau, '03, '05-'06; Ganong, '03, '06; Harvey, '03.
5. Rocky Mountain and Pacific Conifers; Whitford, '05; Gray and Hooker, '81; Piper, '06; Young, '07.
6. Alpine; Merriam, '90, '99; Coville, '93; Fernald, '07.

These environmental unit areas as found to-day, are the result of many successions which, in some cases at least, reach rather far back into the past. This is because some occupy ancient land areas, such as much of the Southeastern Hardwood area. On the other hand, some occupy relatively new regions, that is, at least with regard to the dominant factors now in control, as in the glaciated part of North America and on the Coastal Plain. So far as the present is concerned such relations clearly show that these areas are only the end results of extensive past changes or successions which represent the terminal branches and cross sections of development. It is to the study of such regions and associations that we must turn for the fundamental organization or associational relations of the various elements which compose not only the environments but also the associations of animals.

In order to make as definite as possible the *structural and ecological characteristics* of these formations, certain general relations are here formulated. Throughout this paper it should be remembered that the individual birds and associations of given areas form the units of comparison. Such a distinction is necessary because many species show considerable geographic variation in habits and in the habitats frequented. The writer clearly recognizes the risks and difficulties of such an attempt. They are deliberately put in their present form to *invite criticism and qualification* from

field workers. It is desirable to know the validity of these formations, their internal ecological relations and dynamic tendencies, their relation to dominant environmental influences, etc. A complete list is not attempted, and some of the statements may be only fragments of larger generalizations; but it is just such relations as these which will develop if the entire subject is considered critically and synthetically. Some of the leading characteristics of these larger environmental units and their avian *formations* may be briefly outlined as follows:—

1. The dominance of a limited number of physical conditions or complexes, as climate, topography, vegetation, animals, etc., in a given area produces the primary environmental units and formations.

2. Secondary environmental dominance is shown by a secondary avian association. Thus in the Northeastern biotic center there is a secondary dominance due to water basins in the forest area.

3. A formation or climax society is composed of a relatively (and usually absolutely) limited number of species which are dominant in a given environment of geographic extent. Such dominance, in general, implies extensive range, relative abundance, and ability to indefinitely succeed or perpetuate itself under given conditions.

4. Where dominance obtains, avian variety is limited so that the greatest diversity occurs where local influences prevail, and at the margins of the formation.

5. Correlated environmental and biotic dominance produces what may be considered a *biotic base*, stratum, or optimum, from which departures may be considered less favorable. This is a relative equilibrium, resulting from complete environmental and biotic adjustment, under given conditions.

6. In each formation there is a normal inter-adjustment of the avian species and individuals, in addition to the adjustment with the dominant physical environment. The former is dominated by their structure, habits, and instincts or behavior; hence the colonial breeding or spacing, migration, etc.

7. Each large environmental area or formation tends to have a full complement or set of species, of diverse but supplementary ecological character, such as water, shore or inland birds. One set is likely to be dominant.

8. Relative stability in an association is correlated with the climax dominance, and generally with extreme and slowly changing local influences. Fluctuation is correlated with intermediate conditions.

9. Diversified associations and isolation are greatest with imperfect dominance, but dominance itself produces isolation of the climax association. This diversification produces associations surrounded by others and hence their isolation.

10. The taxonomic elements in different formations vary much, but there are close analogies in the kinds of taxonomic and ecological groups in different formations,—as the *Mniotiltidæ* of the New are represented by the *Sylviidae* of the Old World. *Cf.* Osborn, '02. Le Conte, '50, p. 239*. *Cf.* No. 7.

11. The roughly zonal arrangement of societies about the climax society (= formation) or the environmental optimum, is primarily due either to local reversals, the lagging influence of local or neutral conditions, or to the influence of adjacent formations. This is a result of the retardation of the complete cycle of successions.

12. The primary environmental conditions tend to encroach upon all others. The local conditions thus tend to become transformed in the direction of the dominant environment and to be appropriated by it. The corresponding avian associations are thus given a definite dynamic trend.

13. The mobility of birds during the breeding season is very generally overestimated. The presence of the nest and young renders them for a time relatively sedentary. There are many causes influencing this, such as other individuals, proximity of food for young, homing, instinct etc.

IV. MINOR AVIAN ENVIRONMENTS AND THEIR ASSOCIATIONS.

We have seen that the larger geographic environments or formations are characterized by definite conditions and associations, and at the same time that even throughout these favorable regions the climax association is not distributed with absolute uniformity

because of local variations in the physical features, such as vegetation, water basins, streams, mountains, etc. For the student of local bird life the real work begins when one attempts to examine into the causes and influences exerted by these conditions which break the monotony of the formation and make possible a diversified avifauna. But birds do not always respond as closely to slight local influences as does the vegetation, and for this reason one must learn by experience just what size of units must be used. Thus in the forest a few wind-falls will attract but little attention, but a burn of a few acres will have a noticeable influence in harboring those species of birds which frequent openings; while swifts and swallows ignore many local influences which dominate other species.

It should also be noted that whenever possible it is of distinct advantage to examine all habitats in their original state, uninfluenced by man.

Instead of discussing the leading features of local conditions and their societies or associations in detail, only an outline of them will be given, and that in a form to facilitate use and revision.

1. Minor environments are primarily dependent upon local conditions, and are thus in a sense correspondingly independent of the dominant forces of the region. This is, of course, a relative condition.

2. Minor environments are, as a rule, relatively limited in area. In general their limited area favors their short duration, but age is primarily a result of the rate of change.

3. Marked isolation, even when of extensive linear extent,—as a shore line, along a stream, or an elongate rocky ridge,—is also characteristic of minor environments.

4. Minor environments tend to become encroached upon by the dominant regional influences and ultimately to become extinct. The succession of societies in local habitats is a declining one, while that of the geographic or climax habitat is an increasing and ascending one.

5. Local habitats produce most of the variety within the dominant area, and make possible a diversified avifauna. The structural differentiation within a formation (zones, etc.) is thus largely, in addition to variations in the formation itself, of local origin.

6. Local associations or societies, in general, furnish the essen-

tial clues as to the earlier successions which have attended the evolution or development of regional dominance. The variations in these are due both to the kind of life and to the influence of adjacent associations and centers of dominance.

7. Marginal societies are particularly liable to variation in composition, due to the combined influences of adjacent formations or centers of dominance as well as to local conditions.

8. Comparative studies of local habitats will form the most general and practical guide in the determination of the successions in the formation.

9. Local habitats and societies, in common with the larger environmental complexes, are characterized by the dominance of few physical and biotic factors, and by a limited number of species.

V. AVIAN SUCCESSION.

1. *General Remarks.* Since the breeding grounds are of fundamental importance in the ecology of birds, the study of them in such situations furnishes the greatest source of insight into their life relations. By an avian association, formation or society is meant different combinations of species which *regularly occur together in the same breeding habitat* or area. These breeding grounds must be considered broadly, and include not only the nesting site but also the feeding grounds, even when they are physically very different, because ecologically these conditions form a unit during the breeding season.

It is well known that when a given set of physical conditions are dominant, as in a dense conifer forest, a swamp or an extensive orchard, relatively few individuals and kinds of breeding birds are characteristic of such conditions, except in the case of those nesting in colonies. The field relations of these colonial and isolated breeders are quite different. It is also of importance to recall that abundance is a relative term, with a very different meaning in the case of seed-eating and predaceous species.

Bearing in mind these conditions, bird succession means a change from the dominance of certain species or associations to that of others. Thus in the beginning a slight change in abundance of a

species may be noted, with a corresponding decrease in another; and this proportion may continue to change until the intruder becomes dominant and the rival form may disappear entirely. This process of change, as a rule, is not limited to a single species, but usually involves several or all of the members of the association, as when a dune invades a swamp and the swamp birds are completely replaced by those frequenting the sand dunes.

2. *Succession on Isle Royale.* With these preliminary considerations in mind, we will turn to the ecological succession of bird life upon Isle Royale, Lake Superior. The field work upon the island was carried on by a party from the University Museum of the University of Michigan, under the direction of the writer. Aside from succession, the general ecological relations of the birds were studied by Otto McCreary and Max M. Peet, and elsewhere detailed descriptions of the region and detailed notes will be published. The writer has based his main records of habitat preference upon their work. For this outline of succession only the primary features of the location need be given.

In the present treatment an attempt will be made to follow the genetic succession, at least in its broader outlines. Various qualifications and reservations have been made, and others will follow, so it is hoped that no confusion will be produced by this method of treatment.

Geographically, Isle Royale, Michigan, is an island in Lake Superior, near the North Shore, not far from Port Arthur, Ontario. The *topography* forms a part of an ancient peneplain of moderate relief, glaciated and with an abundance of elongated low ridges and valleys with numerous water basins. The *soil*, which is locally absent, is generally humic or mixed in character, bordering and in the depressions; but is mineral, stony and residual elsewhere. The combined shore and beaches are extensive, largely stony and gravelly, and contain but little sand; much of the shore line is rocky and precipitous; many outlying islands. *Vegetation*, herbaceous in shallow inland waters and as a ground cover except where the shade is too dense, and upon rocks; shrubs on protected beaches, in more open places in the forest and in burns; the forest consists of Tamarack, Black Spruce and Arbor Vitæ in bogs; and elsewhere in mesophytic conditions of Balsam Fir, Arbor Vitæ,

White and Yellow Birch, and rarely Sugar Maple. Upon the dry ridges, Jack Pine; and in burned areas, Aspen and Paper Birch. *Climate*, seasonal changes very pronounced; winters very long and cold, and summers short and cool; a relative humidity of about 80% in December and of about 70% in July (*cf.* Johnson, '07); a mean temperature for January of 7.97° F.; and for July, 62.24° F. (Port Arthur data). Early, deep snows. *Predaceous animals*, as the Lynx, Marten, weasels, Red Squirrel and bats are directly in competition with the birds for food, or prey upon the birds.

The above environmental factors are dominant features and give us a general picture of the conditions, largely in terms of common experience. In the life of the birds, however, a complete reassortment and change of intensity in these factors occurs when they are combined as habitats. The surrounding lake, the numerous bays, small lakes and ponds compose the aquatic habitat and make it a characteristic feature. The very irregular and extensive shore line and limited beach area characterize the coastal border, while inland, excepting the main bodies of the few larger lakes, the encroachment of the bog vegetation upon the shores is such as to prevent an extensive development of sandy open beaches. The above mentioned habitats are open unforested areas; the remainder of the island, with the exceptions of the bare rocky ridges, the clearings and burned over areas, are forested. Very extensive swamp forests abound in the elongate valleys and the borders of the water bodies, and are composed of Tamarack, Black Spruce and Arbor Vitæ. The mesophytic forest occurs on drained areas and is characterized by Balsam Fir, White Spruce and Paper Birch; the burned areas by second growths of aspens and Paper Birch. Then there are also influences which are exerted upon the bird life in general, as for example, migration. In this case, undoubtedly both external conditions and the habits and the behavior must be correlated. Another general and dominant influence should be reiterated here, and that is that all open areas tend to become invaded with vegetation and finally forested, whether they are lakes, ponds, bogs, rock openings on the ridges, burns or clearings. The mesophytic Balsam-spruce forest tends to monopolize *all* habitats, and gives a definiteness to all succession upon the island.

From a genetic standpoint the past and present dominance of the

surrounding Lake must be recognized. This formerly stood at a level much above that of the highest ridges upon the island, as is clearly evidenced by the abandoned beaches on the north shore of Lake Superior. Such relations prove that Isle Royale was once a rocky reef in the lake, which, as the Lake level was lowered (it is quite unlikely that the island has been materially elevated) became exposed as a wave-washed beach. These conditions are approximated to-day by the low outlying islands. The beach or shore is thus the *original* habitat upon Isle Royale, and in general, all others have been derived or developed from it. To discuss these as a truly genetic series would require that these be described *simultaneously*, as the differentiation took place. These habitats did not develop as isolated phenomena, but several developed at the same time, or abreast. Thus as soon as enough of the land surface had become exposed so that its inequalities began to have an influence, the ridges would be the parts best drained, and certain depressions would tend to accumulate the drainage. This process would lead to a simultaneous development or differentiation of the well, moderately, and poorly drained habitats. Almost all of the residual soil formed as the region was baseleveled was probably cleared away by the glaciers; or later, as the waves fell from the island, by the pounding of the waves. Thus the relative absence of a soil must characterize all habitats. At what period life first reached the island in post-Glacial time is not definitely known; but it is likely that the pioneer vegetation of lichens, mosses and low herbaceous vegetation reached it soon after its *exposure*. If the biota reached the island about the time of the formation of the Algonquin beach, which, roughly speaking, may have been at about the present elevation of 475 feet above the Lake surface, it has since spread upward and downward from that level. The composition of the initial societies is not liable to as much variation as the later ones. Thus if the Herring Gulls returned to the region at this early period of the exposure, they were probably the pioneer birds; but if only at a much later date, still other species might have accompanied them. While such variations as this may be expected, and due allowance must be made for them, yet there can be little reasonable doubt but that *water birds* and those frequenting *open places* tended to become the pioneers, and that later, with the development of a soil and forests, other associations of birds became established.

There are at least five important factors which enter into the composition of the past and present conditions which have moulded and are even now moulding the formation of the habitats upon Isle Royale. These five are:— *first*, past climatic changes; *second*, the local topography; *third*, the falling lake surface; *fourth*, dynamic tendency of the vegetation; and *fifth*, the habits and structure of the birds. With these guiding principles, let us now turn to certain details of the resultant succession.

a. The Aquatic Association and Habitat.

The expanse of Lake Superior, the irregular shore line producing coves, the inland water bodies and streams, together furnish an extensive and expansive area of habitat. The cutting of the Lake waves encroaches upon the land habitat, and the deposition by them elsewhere causes minor extensions of the land habitat (as at Rock Harbor where a sand spit furnishes a nesting site for a Kingfisher). Inland the encroachment of the vegetation tends to restrict the water areas, as the falling Lake level has, in the past, tended to increase the land habitat. These processes must be recognized in order to grasp the dynamic tendencies of the habitat.

The *characteristic* aquatic society is composed of the Herring Gull, Loon, American and Hooded Mergansers, and the Pied-billed Grebe; mainly fish eaters and scavengers. Other species, of greater inland tendencies, are attracted by the fish food, as the Eagle, Osprey and the Kingfisher. The Gulls show a decided preference for the great Lake, and the Loon for the inland waters. The presence of the Kingfisher was influenced by the harbor with its attendant sand banks and bars. As all these water bodies near Isle Royale freeze over in winter, the strictly aquatic birds must normally migrate to secure food. Of course none of these birds nest in the open waters, but on the island beaches (Gulls), near the mouths of streams, and inland in marshy places; but all, as a rule, nest near the water. The very young soon attend their parents, and are thus in the water at an age when many land birds are yet helpless in the nest, thus confirming their aquatic habits and habitat. During migrations many other species frequent this habitat.

Where Isle Royale now is, once rolled the open Lake; and it is

not improbable that as the island appeared the Herring Gull was one of the first species to discover it. Such a bird might even reach the island under climatic conditions of the Ice Age, for the species now ranges far north along the shore of the Arctic Sea. A species of such extensive chronological and geographical range will tend to give much stability to succession. The present breeding range of the Mergansers and the Loon is not so far north, and for this reason they may have arrived under milder climatic conditions. But if the island became exposed under mild post-Glacial conditions, all of these species may have arrived at much the same time. But even with the chances for such variations the general succession seems to have been initiated with the aquatic association as the pioneer society.

In following the genesis of the habitats and associations from this point onward, divergence and differentiation becomes so marked that it is impossible to develop all lines abreast. A linear treatment becomes necessary, and therefore certain general relations are liable to become obscured unless specifically mentioned in advance.

The aquatic and beach habitats possess a marked tendency toward a zonal arrangement. From the Superior beach the transition is through open or shrub zones into the climax forest. The topography of the island with its longitudinal ridges and valleys form a dominant factor in impressing this zonal structure upon the biotic associations. This series,—from the water, through the beach, open and shrub marginal zone, into the climax forest,—may be considered as the genetic vegetative succession. They change simultaneously and are due to the same general cause,—the falling Lake surface, which transforms the water area into beach, the beach into forest margin, and forest margin into the climax association. But as mentioned, it is manifestly impossible to discuss all these transitions at once, and each ecological unit must therefore receive separate genetic treatment.

This tension line or marginal zone between the Lake and the forest shows such a wonderful diversity and complexity in its conditions, that several plant and animal associations are formed within

this zone. With its onward march there are simultaneous changes in several associations which, while they will vary in their changes, yet all tend to converge in harmony with the dominant factors. These conditions migrate or radiate from the highest land. On the other hand, the inland marginal zones, which border the smaller water bodies, migrate inwardly; and being closed areas, tend to become extinct. This marginal zone, particularly beyond the upper beach, forms one of the most interesting and complex conditions found upon the island. It is not an ecological unit, but is composed of several of them. This is where most of the confusion arises in actual field work of habitat studies.

b. The Shore and Marsh Association and Habitat.

As the area of the islands expanded and the shore line was lengthened, the habitat for shore birds increased; but the steep and rocky shores were unfavorable for the development of beaches because loose rock, as tools for the waves, was limited in amount. The local character of the shingle and gravel to-day found in the various coves clearly indicates their local origin; and much the same conditions have obtained in the past. On account of these conditions, the sandy beaches are very conspicuously absent. The dynamic tendencies of the beach are those which cause the extension or restriction of the aquatic and beach habitats, supplemented by the drift which is tossed upon the shore. Where there is shallow water, and mud accumulates, favorable conditions are furnished for invertebrate food for birds. Inland, the numerous lakes, ponds and marshes furnish shore conditions which tend to become extinct through drainage or overgrowth of the vegetation, except in those parts of the larger lakes where wave action tends to scatter such accumulations as rapidly as formed, or to prevent its formation altogether.

Although observations on this subject are quite limited, yet it seems fairly safe to consider the Spotted and Solitary Sandpipers as characteristic birds of this association. Upon such a rocky coast, sandy and gravelly beaches are quite exceptional and are confined to protected coves. Additional diversity is produced where small streams enter these coves and produce deltas.

Little is gained by sharply segregating the marsh and shore birds, although the marsh birds show a preference for conditions better represented or correlated with topographically older coasts, protected and inland conditions. Attention should be directed, however, to the significant fact that successions initiated with such diversity will produce a variation in the composition of the associations. Also that so far as possible these variations should be considered comparatively and synthetically in reconstructing and anticipating successions.

The American Bittern, Lesser Yellow-legs, Swamp Sparrow and Marsh Hawk belong to this society of marsh birds. As in the case of the aquatic association, these birds generally nest in close proximity or entirely within these shore or marsh conditions. Still other species frequent this belt to feed, as it is an open area; but their presence is mainly conditioned by the adjacent shrubs or forest. The very limited number of species in the aquatic and shore associations is worthy of particular mention.

The Yellow-legs, Spotted Sandpiper, Bittern and Marsh Hawk range far to the north, even to the Barren Grounds, and thus suggest chances, as in the case of the aquatic association, of an early arrival and succession upon the island.

With the growth of the island, there has been a corresponding extension of the outer and inner shore habitats, although the encroaching vegetation has had a marked tendency to restrict the area of the inland habitat. The dominant environmental influences in this habitat appear to be, 1, the physical character of the shore and beaches; 2, the dynamic forces of the water bodies and streams; 3, the encroachment of the vegetation; 4, the downward migration of the shore; and 5, the habits and structure of the birds.

As a general rule, we may say that the beach of the outer lake tends to be succeeded by either the bog or upland associations, and those inland by the bog association.

c. Bog-forest Association and Habitat.

As just stated the outer coast or an inland one may develop into a marsh or bog habitat or association. In the bog, the Tamarack, Black Spruce and Arbor Vitæ are the pioneer trees in transforming

the open marsh into a forested one; while upon the outer shore the alders and aspens tend to precede the conifers as a general rule. From the bog forest the transition to the Balsam-White Spruce forest may be perfectly continuous, and thus there will be a series characterized by the dominant conifers. In places *Arbor Vitæ* may form the dominant swamp forest, but this is only a variation in the conifer dominance. With improved drainage or the accumulation of vegetable debris, these habitats become converted into the Balsam-spruce climax forest and hence the environmental dynamic tendency.

As the forest encroaches upon the open bogs the Tamarack, Black Spruce, *Arbor Vitæ*, *Cassandra*, Labrador Tea and alders are accompanied by birds characteristic of this early stage; such as the Red-breasted Nuthatch, Yellow-bellied Flycatcher, Golden-crowned Kinglet, Cedar Waxwing, Chickadee, Canada Jay, White-winged Crossbill. Where alders abound the conditions are favorable for the Redstart and the White-throated Sparrow. But later, as the bog conifer forest becomes continuous and dominant, the Waxwing, Redstart and White-throated Sparrows diminish in numbers and finally disappear. Still later, as the swamp becomes eliminated with the development of the climax forest, the Yellow-bellied Flycatcher will also become excluded.

This is perhaps the simplest succession from the water to the climax forest, via the bog forest. This series is very perfectly preserved in all stages and has an extensive range. The number of species in the association is rather large when compared with the preceding associations.

d. Aspen-birch Association and Habitat.

This series develops from the beach as the waves fall from the ridges or low rock surfaces and leave the bare expanses. As the rock disintegrates, decomposes, and humus accumulates, a soil is formed, mainly in depressions or at the bases of the ridges, and from these it tends to encroach upon the open places with a zone of Jack Pine, aspens, or White Birches. These areas are largely strips along the crests of ridges or small park-like openings on rather level rock. In no case are these single areas large, so that the

habitat is only extensive in the aggregate. With the presence of the open aspen and birch woods, the following society is likely to be characteristic:—Junco, Oven Bird, Red-eyed Vireo, Chipping Sparrow, White-throated Sparrow, Flicker, Cedar Waxwing, Wilson's Thrush and the Chickadee. As the deciduous trees are replaced by the open encroaching conifer forest, the Song Sparrow, the Nashville, Myrtle and Black-throated Green Warblers and Wilson's and Olive-backed Thrushes, which frequent the forest margins, increase in abundance. The Oven Bird has an extensive northern range from Labrador into the Yukon Valley and may well have been a very early pioneer upon the island as the aspens and birches were probably the first broad-leaved tree arrivals. From the above it is seen that this means an extensive variety, but as the dominance of the climax forest encroaches this number again becomes reduced.

The composition of the society varies somewhat, depending upon the surroundings, as proximity of the present shore or distance from it. Many of these openings are continuous with the present beach. It is not improbable that this was a prominent society whenever the waters fell rapidly from the island between rather stationary levels. This has been a society decidedly on the decline with the encroachment of the forest.

Probably this association varies considerably in its composition, and has done so in the past; but its main features are fairly constant. These variations seem likely, through the influence of openings produced by fires which, when extensive, may have caused a new equilibrium among those species frequenting openings.

The Burned Area Association.

This phase should perhaps be considered as supplementary to the aspen-birch association just considered. A fire brings about a reversal of conditions through the destruction of the forest, and in some cases, a part of the soil as well. As there are all degrees of extent and completeness in this process, there is a corresponding variation in the details of the resulting succession, at least in its early stages. It is only when there is a very complete destruction of the vegetation that the continuity with former occupancy is wholly broken.

The easily inflammable character of these conifers, even when in a green condition, makes it likely that natural causes, such as lightning or marsh gas (*cf.* Penhallow, '07), may have been influential. The proximity of the gas supply and the conifers is of interest as this may influence their liability to fire and thus to this sort of reversal of conditions. Thus liability to fires is rather characteristic of the region, and man's influence has tended merely to reinforce rather than to introduce this feature. Thus it seems probable that fires have been a factor in supplementing the natural park-like openings. In addition to the burned areas found upon Isle Royale, other limited open areas are due to cultivation and are kept open.

The birds characteristic of the more open situations are the Sharp-tailed Grouse, Song and Chipping Sparrows, Flicker, and the Purple Finch. The Grouse is a Plains form, is near its eastern limit, and is perhaps a late arrival upon the island. The other species are wide ranging in the Canadian coniferous forests but are not of such northern range as the aquatic and shore associations. There is nothing in their range to suggest their arrival earlier than the forest association. Taking all the birds of the openings together, it is not improbable that they arrived at about the same time as those of the forests, but frequented different situations,—the forest kinds occupying the slopes and drier valleys, and the others the openings.

e. The Climax Association or Formation and Habitat.

The climax association should not be considered in such a way as to lead one to think that it is *distinct* from the other associations. It belongs to *all* of them as the end of their series under existing biotic and environmental conditions. Thus the aquatic association, through the bog conifers, is transformed into the Balsam-spruce association; and from the beach through the aspen-birch association again to the balsams and spruces. The climax association is the condition of adjustment toward which all societies move under the present conditions. For this reason the earlier stages, conditions and associations of the climax have been outlined in the preceding discussion.

In the dominant forest the dense shade prevents an extensive

ground cover of herbaceous plants; and although Ground Hemlock is abundant locally, yet in places the forest floor is quite open and free from lower shrub growth. The remarkable preservation of trails or roads through such tracts shows clearly how slowly changes take place. Such a habitat must be relatively equable in its temperature and moisture relations.

Geographically speaking, the primary characteristic of the climax is its *relative stability*, due to a dominance or relative equilibrium produced by the severe environmental and biotic selection and adjustment throughout the process of succession.

At this point attention should be called to the fact that dominance is a resultant of an equilibrium produced by neutralizing or overcoming other forces and influences. We may think of the process of succession as a stream of forces whose development may be compared with the transformation of a drainage line,—such as, for example, that of a rivulet into a creek, and then into a river. The stream and the character of the ground mutually influence each other and the course followed is a resultant of the mutual adjustments. The stream is deflected by one condition and then another, just as succession varies with local conditions; yet the water continues to run down grade and seeks an equilibrium, and similarly, biotic succession continues on its course deflected here and there by local influences, yet forever tending toward a state of biotic equilibrium. The dominance of the climax society or formation, considered as a process rather than a product, has much in it that is analogous to the dominance produced by the process of baseleveling.

The characteristic birds of the climax forest are:—the Chickadee, Golden-crowned Kinglet, Red-breasted Nuthatch, Canada Jay, Downy, Hairy, Arctic Three-toed and Pileated Woodpeckers, and the White-winged Crossbill. Here again the association becomes small in variety of species and comparable with the small society which must have been associated with the complete dominance of the Lake waters. Thus there has been a development of diversity from simplicity, with later a return to simplicity. To these birds of the forest should also be added those species of general distribution, as the Eagle, Swift, Swallows, etc., a class of birds whose predaceous, insect-feeding and wide ranging habits make them particularly difficult to properly associate. A careful study of

this class of birds will be necessary before they can be satisfactorily correlated with their proper avian associations.

But let us not overlook the fact that even this dominance is only *relative*, for since the Ice Age even this *entire formation* has migrated northward, and a true succession has been produced with its attendant changes in the conditions and in the composition of the associations. Just as upon Isle Royale a definite dynamic trend was given to the complete environment by the falling Lake surface, so in the post-Glacial northward migration there was a northward migrating climate. These conditions determined that on the *north side* of this immense succession or migration habitats and associations were developed which are comparable to those attending the downward march of the Isle Royale beach; and even to-day, by passing from Isle Royale to the tree limit with its zone of aspens and birches, one may find representatives of the various kinds of associations which in all probability moved north, just as to-day in passing from the forest to the rocky beach balsam and spruce are encountered before the aspens and birch. If however, this is only another case of convergence and not at bottom the same or a comparable process, we are then certainly far from an understanding of even the general nature of the problem.

3. *Internal Factors.* With the idea of succession, as exemplified by Isle Royale, let us turn to other factors which influence the internal relations of the birds within an association or society, because such relations are also necessary to an intelligent understanding of succession. Some of these general relations have been outlined, but certain others are needed which have been well expressed by Brewster ('06, p. 62-63): "Many if not most birds show a marked preference for breeding in certain regions, throughout which they are more or less evenly and generally distributed, but within which their numbers do not seem to increase beyond fixed maximum limits no matter how carefully the birds may be protected or how successful they may be in rearing their young. . . . I have observed — as, indeed, who has not! — that few birds — excepting those which, like Swallows, Terns, Herons, and Gulls, are accustomed to nest in colonies — tolerate very near neighbors of their own species during the season of reproduction. At its beginning each pair takes possession of a definite tract of wood-

land, orchard, swamp or meadow, which the male is ever on the alert to defend against trespassers of his own kind and sex, although he often seems quite willing to share his domain with birds of other and perhaps closely related species. The extent of the area thus monopolized varies exceedingly with birds of different species. An apple orchard which affords sufficient room for — let us say — two pairs of Yellow Warblers, two pairs of Orioles, three or four pairs of Chippies and four or five pairs of Robins, seldom or never harbors more than a single pair of Kingbirds or Crested Flycatchers As a rule, the species which roam over the most ground in the course of their daily wanderings claim and maintain the broadest preserves, while those of sedentary habits often content themselves with very modest freeholds. Whatever the extent of the domain, the birds who occupy it as a summer home evidently regard it as exclusively their own. The readiness and celerity with which trespassing birds are accustomed to retire when attacked or even merely threatened by the established tenants, has seemed to me to indicate that the claims of temporary ownership are respected by all right-minded birds. . . . In my opinion the desire for exclusive possession so conspicuously shown by the male, and often by him alone, is usually the direct result of *sexual jealousy*. This, as is natural, makes him intolerant, during the breeding season, of the near presence of rival males. If his concern were chiefly in respect to the food supply, it would be equally manifested at every season and towards all birds who subsist on the same food that he and his mate require — which is certainly not the case."

The tendency of pairs and species to *space themselves* and to become *relatively sedentary* is thus a characteristic condition in an association, and is an important element in an understanding of succession because it shows the internal organization and habit with which an invader or pioneer from another association has to contend. As Dixon ('97, p. 91) has pointed out, this spacing tendency is an important factor in the extension of range of species and is intimately related to the location of nesting sites. These facts clearly show that both these internal influences and the environmental ones must be distinguished if we wish to determine the relative influence of each and their bearing on succession. The above quotation from Brewster clearly shows that in general not only a

greater number of birds can live in a given area, but also that they can live closer together, if they vary in kind. Then again, within the association there are marked differences in habitat preference. Thus in the forest there are those birds which nest in the trunks or among the topmost branches of the trees, or even upon the ground; and these are differences largely distinct from the spacing of the pairs of the same species. These influences must be recognized among the dominant influences within the association, and upon which much emphasis must be placed.

4. *Environmental Factors.* Then in addition to these internal factors, there are the dominant physical factors. In the following discussion primary emphasis will be placed upon succession as found in the Northeastern Biotic or Conifer Center, because successions at other centers with different biotic components and other dominant physical conditions must possess a certain amount of individuality, in addition to those features common to succession in general. The dominant biotic tendency or dynamic trend of this center, as a *resultant of all internal and environmental influences*, is for the conifer biotic association to *encroach upon all other societies and habitats and to become the dominant or universally distributed association*. Thus, in general, all habitats produced by local influences tend to become transformed into the dominant biotic association or formation. In general also, small bodies of water are rapidly encroached upon by inwash, vegetation or drainage, and tend to become extinct and forested. All other openings, as the rocky ledges and ridges or burns, are encroached upon as soil accumulates or fires are prevented, and the forest biotic association spreads over the entire area.

From such relations it will be seen that our knowledge of the causes and conditions of succession must largely result from the study of these *local environments or habitats and their biotic succession*, because, where dominance is established the succession is almost completely obliterated. *Each minor habitat and society is to be looked upon as simply a stage, more or less temporary, in the onward wave toward the dominant or climax association*. Thus in the marshes, birch or aspen woods, rock openings and ponds may be "orginal" conditions which are becoming cumulatively transformed in the direction of the final dominance of the climax biotic type.

The relatively slow rate of change in many environmental processes and the relative stability of the climax biota,¹ is doubtless the basis for the current view that such conditions are relatively constant or fixed; but that change and not constancy is the normal and usual condition in nature is quite evident upon a moment's reflection. Almost every one notices these changes after an absence of a few years from a region. Thus intimacy tends to blind us to changes unless a *habit* of giving attention to them is deliberately cultivated. For this reason some find it almost impossible to recognize environmental changes or to comprehend their significance. It is therefore of practical value to clearly recognize under what conditions changes may be most readily perceived. Therefore the importance of the study of *local influences* is emphasized, and the necessity recognized of distinguishing the dominance of geographic and relatively stable conditions or formations as contrasted with those due to local and often relatively changeable conditions. Then among these changes we must distinguish those which are mere fluctuations and those which are indicative of the true progressive succession. This is mainly accomplished by attention to general relations and the subordination of minor details.

5. *Environmental and Associational Convergence.* At the present imperfect stage of ecological development, comparison must furnish us the most important and general clues to the processes of succession; and undoubtedly this method must long remain as our main guide on account of its comprehensive application and the magnitude of the problem to be solved. It is therefore desirable that the limitations of the method should be clearly borne in mind. It is often assumed that the implied successions of a given place are the same as those which have developed at that place in the evolution of the present climax. But as we positively know that *many different causes are able to produce the same or very similar results*, such conclusions must be received with due caution. That the dominant geographic conditions tend to override local influences seems very fairly established because *diverse local or original conditions are transformed into the climax or dominant type*. This clearly shows that in time diverse local influences have flowed into the general environmental trend or current and have become a part of it.

¹ For the migrations of climax societies, cf. Adams, '05.

There is thus a very strong *convergent* tendency. By convergence is meant the independent production of the same kind of association from diverse starting points or habitats and associations. Quite minor ecological units may show similar but temporary convergent tendencies in their succession. It is therefore not surprising that any marked environmental dominance will tend to produce similar or convergent results, even in local areas. Under such circumstances similar associations or societies may be independently and repeatedly formed by the selecting environmental influences, such as, for example, are found in the numerous small lakes scattered throughout the coniferous forests. This convergent phenomenon is certainly a fertile source of confusion throughout all phases of science. Perhaps the best guide through such a labyrinth will be to clearly bear in mind the relative value of general and local influences, and watch with an "eternal vigilance" for convergent results due to diverse causes. This convergent phenomenon is particularly liable to occur in the case of environments produced by reversible physical conditions. It should further be stated that a study of these problems from a genetic and dynamic point of view will aid in recognizing such results. Under such circumstances attention is primarily directed toward the dominant causes and conditions of change rather than to the stages, products, and results produced by them. Convergence thus viewed is the result of several causes and should be considered a product rather than a process. This same distinction may be made for all societies, associations and formations. *Convergent phenomena are thus particularly liable to confuse wherever products rather than genetic processes receive primary emphasis.*

6. *Succession and Environmental Evolution.* The relation of succession to general biological problems is very intimate. This opens up a very extensive field which is only mentioned to indicate its general relation to succession. The facts of succession and evolution must ever remain far in advance of our knowledge of their causes. If, however, one turns to the standard evolutionary treatises and searches for a discussion of the evolution of the environment, as correlated with animal evolution, only the most general, or the elementary and superficial phases, are as a rule discussed. To be sure, certain papers and treatises take up special phases of

the problem, and the broadest phases are treated by the geologists; but none of them seem adequate as a comprehensive treatment of so important a subject. Succession, broadly and genetically considered (dynamic rather than static), is a phase of environmental evolution.

7. *The Relation of Succession to Organic Evolution.* Mention has been made of the relation of succession to environmental evolution, but its relation to the organic evolution of birds should also be indicated. The mutual relations of organic and environmental evolution have been and will continue to be the battleground of biological thought for an indefinite length of time. Here lies the tension line between the two main schools of biological interpretation.

One school maintains that all *causes* of evolution are *internal*, and that the environment is only a *condition*, not a cause. From this point of view the fundamental causes are internal and therefore environmental conditions can only indirectly influence evolution through the weeding out of those forms not in harmony with the conditions; and hence it has a *selective* rather than an *originative* influence. From this point of view succession and environmental evolution can contribute nothing to the elucidation of the *causes* of organic evolution, though they may to an understanding of the selection produced by the succession of conditions in which organic evolution has taken and is taking place. In harmony with this point of view, succession, broadly treated, should furnish a fundamental method of treatment for the process of selection, and the detailed principles of its working. This would certainly be an important advance because natural selection has frequently been reproached for its indefinite methods and lack of definite treatment. Succession from this point of view is primarily related to the Darwinian factors of evolution. No doubt this is one reason why Darwin himself put such high value upon the study of ecological relations of animals, *i. e.*, their relation to their complete environment, or their struggle for existence.

If, however, all causes are internal and not directly subject to external influences, they must be beyond experimentation to a corresponding degree. Under such conditions evolution becomes a *descriptive* rather than a *causal* science, and all that investigation

can do is to describe the succession of forms produced by these internal causes.

On the other hand the rival school maintains that both internal and external conditions may be real *causes* of organic evolution. This is thought to be brought about by the direct or indirect influence of the environment upon the germ cells, by environmental selection, or even by both combined. From such a point of view the environment may thus be either a *cause* or a *condition* of organic evolution, or both. From such a standpoint the evolution of the environment receives increased importance, as under such conditions organic and environmental evolution are causally related, and thus intimately correlated. Viewed thus, environmental evolution is more than the description of the succession of conditions, but may be explanatory as well.

The particularly significant feature is that environmental evolution and biotic succession are of great value and can contribute either to the causes or conditions, or to both, of evolutionary advancement.

VI. SOME ADVANTAGES OF A KNOWLEDGE OF THE LAWS OF SUCCESSION.

The study of succession implies a detailed knowledge of the field relations of birds, and as this has received so little attention as a subject of special study, it is perhaps worth while to briefly mention some of the practical and scientific advantages which we may reasonably expect will result from the development of this phase of investigation.

The current discussions of environments are generally very fragmentary and chaotic, and the careful study of bird habitats and succession will greatly improve this phase of ecology. Here is a field of study in need of distinct recognition as a subject worthy of detailed investigation; in addition to those lines already current. When once this field is developed, then and only then will it be possible to intelligently discuss the evolution of avian environments and to correlate them with the evolution of birds themselves. It is quite probable that one of the main conditions which prevents a

more rapid advance along evolutionary lines is in a large measure due to the almost utter failure to analyze dynamically environmental complexes. Succession, studied in its broader aspects, should greatly aid in the formulation of the laws governing the "struggle for existence," which is frequently condemned for its indefinite character.

From another point of view there are very important reasons for urging extensive studies of this character at a relatively early date, because the encroachments of civilization, which by the destruction of the forests, the drainage of the land, irrigation, farming and grazing of the grasslands, are rapidly destroying original environmental conditions before they are studied ecologically. Much of Europe has already gone through this stage of demolition, and it is only to new and relatively unmodified countries that we can look for an adequate statement of these problems and their relations in their original and primarily evolutionary and developmental form. It is not improbable that the next generation may wonder why some subjects, the investigation of which might have been delayed, have received detailed attention, while others equally or perhaps even more important have been almost ignored and must forever remain unknown because of this neglect to secure the "vanishing data." (Cf. Haddon, '03.)

Such ecological studies may be expected to have a valuable reflex influence upon the naturalist himself. We may hope that the future revisor of a group of birds will consider a knowledge of the field relations of his specimens as an essential qualification, just as at the present time a large series of specimens is held necessary. Fifty years ago a limited series was considered no disqualification, just as to-day the lack of a knowledge of their ecological relations is not so considered. Perhaps our ideas of relative values must change. In this connection a statement from Tristram ('94, p. 472) is to the point:—"The closet systematist is very apt to overlook or take no count of habits, voice, modification and other features of life which have an important bearing on the modification of species. To take one instance, the short-toed lark (*Calandrella brachydactyla*) is spread over the countries bordering on the Mediterranean; but along with it, in Andalusia alone is found another species, *Cal. baetida*, of a rather darker color, and with the second-

aries generally somewhat shorter. Without further knowledge than that obtained from a comparison of skins, it might be put down as an accidental variety. But the field naturalist soon recognizes it as a most distinct species. It has a different voice, a differently shaped nest; and, while the common species breeds in the plains, this one always resorts to the hills. The Spanish shepherds on the spot recognize their distinctness, and have a name for each species."

Many examples of similar character might be cited to show the scientific value of a knowledge of the environmental relations of birds, and a moment's reflection will show that the problem of succession is only a small part of the general problem of environmental relations of plants and animals. Attention has already been directed to the relation which this general subject bears to evolutionary problems.

It is not at all unlikely that succession is very closely related to some of the causes of bird migration, and that with advance in this subject much light would be thrown upon migration. Migration is doubtless another illustration of convergent phenomena. In all probability, migration has originated not only independently in very diverse kinds of birds, but perhaps repeatedly, from different causes, even in the same group. The causes of migration must be numerous, varying with different ecological groups, which appear to be the true natural units for study and comparison. Thus the comparative study of migrations of different kinds of associations, as formations and societies, should lead not only to a better understanding of the various associations, but should also contribute to the general subject of migration which seems to have shown a tendency toward stability in the current methods of study. It scarcely seems probable that with the diverse formations inhabited by birds, and with their ecological diversities there should be only a few causes of the phenomena.

To keep pace with successions animals must either adjust themselves, change their habitat, or migrate. From such relations it is evident that various supposed environmental responses must be *tested primarily within the association and environment to which the animal normally belongs.* To this class belongs protective coloration and allied phenomena. To be of fundamental value, the

influence must have some permanence and this may be sought in the *dynamic* trend and dominant influences of different associations. It is difficult to conceive of other more reliable methods of approach to such problems.

In addition to the scientific value of this line of investigation, there are important economic applications of the laws of avian environment. This is particularly true of forestry and agriculture. The forestry problem is continually becoming more important, but the relation of bird life to forests and forest succession has received little attention. As agents for scattering seeds of trees and shrubs, birds are very important. Here is where the interests of the avian ecologist and forest ecologist overlap. The student of bird life will wish to know how a region is to be reforested, and what succession of bird life will attend the succession of the forest as reforestation progresses. On the other hand, the forester will wish to know how birds will aid or retard him in the process of reforestation. Then, in guarding or protecting the forest, what help can be secured from birds with regard to insect pests? These are only samples to show that here is a field which, as time advances, will become of more and more importance, and that these problems will eventually call for specially trained men to handle them.

In connection with forestry and agriculture we have quite exceptional conditions for extended experimental studies in bird succession as related to forest succession, crop rotation, etc. The relation of birds to agriculture appeals to a much larger number of people than does their relation to forestry. There are several reasons for this; first, because more persons are interested in farm and horticultural crops than in forests; and second, because birds are soon attracted in such large numbers by the food supply of grains and fruits which these crops so greatly increase, that the extensive destruction by birds readily attracts attention. And while we hear much of the great reduction of certain species of birds in parts of the country, it is not at all improbable that with the destruction of the forests (which were dense and dominant and tended to *limit* the abundance of many species frequenting the open), and the increase of food in cultivated fields, there has been an increase in the total number of birds, even in spite of the great numbers killed by man.

But to the phase of succession with which we are primarily

concerned, almost no attention has been given, in spite of its fundamental relation to crop rotation and the corresponding avian succession attending this. Indeed there seems to be a very decided need of a thorough investigation and discussion of the general principles underlying all these economic problems, that they may be brought into harmony with the advances made in some other phases of ecology.

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October 21, 1907.

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THE BIRD COLONIES OF THE OLYMPIADES.

BY WILLIAM LEON DAWSON.

THE recent creation by executive order of three reserves among the islands which lie off the west coast of Washington has served to call attention for the first time, in an ornithological way at least, to this hitherto little-known coast. The reasons for previous neglect are not far to seek. No really safe harbors offer, for even the smallest craft, between the mouth of Gray's Harbor, Lat. 46° 56' N., and the Straits of Juan de Fuca, Lat. 48° 24' N. The prevailing winds are westerly, and the aspect of the coast so menacing, as viewed from the seaward side, that mariners have always given it a wide berth, save when seized by some hapless mischance of reckoning or tackle.

No commercial exploitation of the tributary country has been attempted, beyond the preëmpting of timber lands some twenty years ago, and the occupation by hardy settlers of a few small prairies and rich alluvial bottoms. Only recently a spur of the Northern Pacific Railway has been built from Hoquiam, on Gray's Harbor, to Moclips, on the coast; and this latter point marks nearly the northern extension of a splendid sea-beach, hard as macadam, which stretches south, practically to the Columbia River. To the north of Moclips the beginning of the rough way is marked by Point Grenville, and the ocean drive becomes a tradition.

The ruggedness of the succeeding stretch is occasioned apparently by a great fault, or crack in the earth's crust, running roughly north and south. The sea-floor has been dropped to westward leaving the exposed edges of the strata on shore to the mercy of the waves. In some places the tough strata, chiefly sandstone and conglomerates, presumably Miocene, were bent sharply before breaking; so that now, in the form of detached islets and promontories, they stand on edge, balancing in the most precarious and fantastic forms. One such rock, off Toleak Point, rises to a height of one hundred feet, with a thickness of only twenty at the tide line,—so thin, indeed, that the sea has worn a keyhole near the bottom and the air another near the top. Moreover, the shore-line is complicated by transverse folds of rocks, the precursors of the Olympic Mountains to the eastward; and these are usually marked offshore by a chain of islets in descending series, the outermost member of the series being the most denuded, and the innermost being mere detached fragments of the mainland with forest crowns intact. It is thus that the more than one hundred and thirty islets which rise above the spray-line, are grouped into nine principal systems, roughly corresponding to the chief promontories.

The coast-line of this hundred mile stretch is further interrupted by several rivers, none of them long streams, but each of considerable volume because of the extraordinary rainfall which characterizes this section. The precipitation at La Push was 155 inches for the year 1905, and 100 inches for the last five months of 1906. It goes without saying that "saturated" plumages may be found here in their perfection. There is a corresponding density of vegetation, especially along the crest of the sea-wall, where the jungle of salal and dwarf salmon-berry is nourished by ten months of rain and mist and two of fog, and where the rough trail which is resorted to at high tide resembles a tunnel rather than a footpath. A luxuriant growth of evergreen timber, chiefly tideland spruce and giant cedar, covers the entire western slope of the Olympic peninsula; but along the immediate shore-line it often presents a stunted appearance, due either to salty spray or wind, or both. Those islands which are totally devoid of trees may, nevertheless, be crowned with an almost impenetrable growth of mingled salal

and salmon-berry; or, failing that, may support a heavy crop of saw-grass centrally, and wire-grass upon the slopes.

Because of their proximity, considered as a whole, to the Olympic Mountains, and because they are in a sense a by-product of the same orogenetic movement, I have proposed for these western islands the name Olympiades (pronounced Olympiah'-deez). The name will be all the more convenient now that they are arbitrarily divided into three administrative groups, the Copalis Rock Reservation, the Quillayute Needles Reservation, and the Flattery Rocks Reservation.

In July, 1905, the writer, accompanied by wife and child, effected a reconnaissance of these islands, using for the purpose the staunch cedar canoe of the Northwest, manned by two Indian boatmen. We launched at Point Grenville on July 7 and arrived at Neah Bay on the 25th of that month. As the trip was purely ornithological, practically all the rocks, save Copalis at one extreme and Tatoosh at the other, were inspected, and landings were made upon twelve of them which bore the largest bird colonies. In each case the attempt was made to estimate the bird population as well as to ascertain the horizon of species. The results obtained were supplemented by an expedition in June, 1907, in which I had the pleasure of being accompanied by Professor Lynds Jones. On this latter occasion, starting from Neah Bay, we went as far south as Destruction Island, using as before the Indian canoe, and returned over the same course, June 4 to 24.

Among the sea-birds we found the breeding population of the Olympiades to comprise the following species:

- Tufted Puffin (*Lunda cirrhata*).
- Rhinoceros Auklet (*Cerorhinca monocerata*).
- Cassin Auklet (*Ptychoramphus aleuticus*).
- Pigeon Guillemot (*Cepphus columba*).
- California Murre (*Uria troile californica*).
- Glaucous-winged Gull (*Larus glaucescens*).
- Western Gull (*Larus occidentalis*).
- Kaeding Petrel (*Oceanodroma kaedingi*).
- White-crested Cormorant (*Phalacrocorax dilophus cincinatus*).
- Brandt Cormorant (*Phalacrocorax penicillatus*).
- Baird Cormorant (*Phalacrocorax pelagicus resplendens*).
- Black Oystercatcher (*Hæmatopus bachmani*).

Of these twelve three, viz., *Cerorhinca monocerata*, *Ptychoramphus aleuticus*, and *Oceanodroma kaedingi*, were never seen by daylight save as unearthed from their nesting-burrows.

Baird Cormorants, the Gulls, and the Oystercatchers are by no means confined to the islands enumerated below, but are found upon all the lesser rocks as well as upon the more rugged parts of the mainland shore,—in short, wherever conditions are suitable. The Oystercatchers do not colonize in the strict sense, and are usually distributed at the rate of a pair to a rock, but the largest islands may boast from three to a dozen pairs of them. The Baird Cormorants have a single eye to the availability of a nesting spot, stipulating only that it shall be upon the side of a wall, and as nearly inaccessible as possible; but whether affording shelter for one pair or a hundred matters nothing.

The Western Gulls occupy exclusively the southern members of the Olympiades, and give way before Glaucous-wings from Destruction Island northward. A slender strain of the darker bird, however, reappears in the larger northern colonies of nesting *glaucescens*, and their apparent interbreeding with the latter is worthy of careful investigation. The Gulls, while preferably nesting in colonies, nevertheless overflow by pairs and dozens upon the smaller pinnacles, so that no exact account of their nesting places is possible.

The following species of non-breeding sea-birds appear to occur regularly along this coast in summer, and are listed in the order of their abundance, beginning with the most numerous:

Marbled Murrelet (*Brachyramphus marmoratus*).
Dark-bodied Shearwater (*Puffinus griseus*).
White-winged Scoter (*Oidemia deglandi*).
Surf Scoter (*Oidemia perspicillata*).
Harlequin Duck (*Histrionicus histrionicus*).
American Scoter (*Oidemia americana*).
Holbøll Grebe (*Colymbus holbøllii*).
Western Grebe (*Echmophorus occidentalis*).
Loon (*Gavia imber*).

So late as the 5th of June Pacific Divers (*Gavia pacifica*) were found migrating northward in considerable numbers; as were also Northern Phalaropes (*Phalaropus lobatus*). A flock of Heermann

Gulls, sighted on Split Rock July 12, 1906, are believed to have been migrants *en route* to Puget Sound (more strictly Washington Sound, as the lower portion is called) via the Straits of Juan de Fuca.

As early as the 7th of July shore birds were returning, and we noted the following species in that month:

- Pectoral Sandpiper (*Actodromas maculata*), July 7.
- Western Sandpiper (*Ereunetes occidentalis*), July 7 ff.
- Knot (*Tringa canutus*), July 7.
- Black Turnstone (*Arenaria melanocephala*), July 12 ff.
- Wandering Tattler (*Heteractitis incanus*), July 13 and 16.
- Semipalmated Plover (*Egialitis semipalmata*), July 16 and 17.
- Yellowlegs (*Totanus flavipes*), July 16.
- Hudsonian Curlew (*Numenius hudsonicus*), July 16 and 25.
- Ruddy Turnstone (*Arenaria morinella*), July 17.
- Northern Phalarope (?) (*Phalaropus lobatus*), July 25.

It is not expected that the Censuses following will prove anything less than tedious to the casual reader; but it is believed that a concise record of the present bird population of the Olympiades will prove of value in the future in attempting to measure the effect of changed conditions. Inasmuch as some of the islands are here named for the first time, it has seemed wise to add a brief physical description of each, as well as to give its approximate location as determined by measurement of Coast and Geodetic Survey Chart No. 6400. Heights of islands are oftener guessed than otherwise, inasmuch as the Coast and Geodetic Survey chart figures are sometimes grossly inaccurate; *e. g.*, "Perkins Reef (110)" — it is not really more than 25 feet above tide; "Carroll Islet (126)" where (226) is evidently intended, etc.

"R" signifies breeding resident; and "V" visitor, whether migrant or from the mainland. Only adult birds are counted.

ERIN.

Loc.—Lat. 47° 18' N.; Long. 124° 16'; S. E. from Point Grenville; offshore 200 yds.

Area.—About 1½ acres.

Desc.—A rock, 125 feet high. Perpendicular half-walls except on north side, where climbable. Shaped like a curb roof on top, sloping W., N., and E. Earth-capped, with dense wire-grass.

- | | |
|---------------------------------|---------------------------|
| R. Tufted Puffin, 2000. | R. Baird Cormorant, 50. |
| R. California Murre, 20. | V. Pectoral Sandpiper, 6. |
| R. Kaeding Petrel, 10000-25000. | |

ERIN'S BRIDE.

Loc.—As last; offshore 275 yards.

Area.—About half-acre.

Desc.—Narrow rock 125 feet high with nearly perpendicular sides and unclimbable. Covered with fresh Cormorant guano.

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|----------------------------------|--------------------------|
| R. Western Gull, 50. | R. Baird Cormorant, 100. |
| R. White-crested Cormorant, 100. | |

THE GRENVILLE ARCH.

Loc.—Lat. 47° 18' 20" N.; Long. 124° 17' W.; S. W. from Point Grenville; offshore half mile.

Area.—About 1 acre.

Desc.—Conical rough rock 100 feet high, sloping on S. and W., perpendicular on N. and E.; tunnelled through middle by large arch about 40 feet high.

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|----------------------------------|---------------------------------|
| R. Pigeon Guillemot, 10. | R. Brandt Cormorant, 100. |
| R. California Murre, 10. | R. Baird Cormorant, 100. |
| R. Western Gull, 50. | R. Black Oystercatcher, 1 pair. |
| R. White-crested Cormorant, 100. | |

THE GRENVILLE PILLAR.

Loc.—Just off Grenville Point.

Area.—About quarter acre.

Desc.—Perpendicular, undercut on N., unscalable. Earth-topped, with grass.

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|---------------------------|----------------------------------|
| R. Tufted Puffin, ? | R. White-crested Cormorant, 100. |
| R. California Murre, 500. | R. Brandt Cormorant, 100. |
| R. Western Gull, 40. | R. Black Oystercatcher, 1 pair. |

SPLIT ROCK.

Loc.—Lat. 47° 24' 20" N.; Long. 124° 21' 45"; offshore about one mile.

Area.—About 1 acre.

Desc.—Barren double rock of metamorphic breccia, 85 feet high, very rough as to surface; north slope covered with small water-holes.

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| R. Pigeon Guillemot, 10. | R. Black Oystercatcher, 1 pair. |
| R. Western Gull, 200. | V. Heermann Gull, 10. |
| R. White-crested Cormorant, 2 pairs. | V. Western Sandpiper, 6. |

WILLOUGHBY ROCK.

Loc.— Lat. 47° 24' 40" N.; Long. 124° 21' 22" W.; offshore $\frac{1}{2}$ mile.

Area.— About 3 acres.

Desc.— 125 feet high, rounded, earth-capped over worn metamorphic conglomerate; vertical on W., very steep S., N. and E., but climbable on south. Heavily grassed on top, guano-covered on sides,— a varied and populous rookery.

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|---------------------------------|---------------------------------|
| R. Tufted Puffin, 500. | R. Baird Cormorant, 500. |
| R. Pigeon Guillemot, 10. | R. Black Oystercatcher, 1 pair. |
| R. California Murre, 300. | V. Black Turnstone, 1. |
| R. Western Gull, 100. | V. Western Sandpiper, 10. |
| R. White-crested Cormorant, 50. | |

DESTRUCTION ISLAND.

Loc.— Lat. 47° 40' 20" N.; Long. 124° 30' W.; offshore $3\frac{1}{2}$ miles.

Area.— Top 60 acres — with surrounding reefs; about $\frac{1}{2}$ square mile.

Desc.— A flat-topped island with sharply sloping or nearly perpendicular sides, rising 60 feet above tide. Covered by dense growth of vegetation, chiefly salmon-berry and salal thickets growing to height of a man's head, or higher on top; same with grass and bushes of other sorts on sides. Composed of deep loam (guano?), clay, gravel (incipient conglomerate of Pleistocene age) in descending series, resting unconformably upon the upturned edges of Miocene sandstone. Extensive area of sandstone reefs exposed on all sides of island at low tide, including ribs and ridges of sculptured rock unreached by water save in time of storm.

- R. Rhinoceros Auklet, 10,000.
R. Pigeon Guillemot, 30.
R. Glaucous-winged Gull, 2 pairs.
R. Black Oystercatcher, 12 pairs.
R. Rufous Hummer (*Selasphorus rufus*), 20.
R. Rusty Song Sparrow (*Melospiza cinerea morphna*), 100.
R. Sooty Fox Sparrow (*Passerella iliaca fuliginosa*), 100.
R. Barn Swallow (*Hirundo erythrogaster*), 20.
R. Lutescent Warbler (*Helminthophila celata lutescens*), 100.
R. Yellow Warbler (*Dendroica aestiva*), 4.
R. Western Winter Wren (*Olbiorchilus hiemalis pacificus*), 10.
R. Russet-backed Thrush (*Hylocichla ustulata*), 100.
R. Western Robin (*Merula migratoria propinqua*), 2.

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|--|----------------------------|
| V. Glaucous-winged Gull, 300. | V. Yellowlegs, 1. |
| V. Western Gull, 20. | V. Wandering Tattler, 1. |
| V. Heermann Gull, 10. | V. Hudsonian Curlew, 2. |
| V. White-crested Cormorant, 40. | V. Semipalmated Plover, 6. |
| V. Baird Cormorant, 200. | V. Ruddy Turnstone, 3. |
| V. Fannin Heron, 2. | V. Black Turnstone, 25. |
| V. Western Sandpiper, 400. | |
| V. Bald Eagle (<i>Haliaeetus leucocephalus</i>), 1. | |
| V. Peale Falcon (<i>Falco peregrinus pealei</i>), 1. | |
| V. Black Merlin (<i>Falco columbarius suckleyi</i>), 1. | |
| V. Desert Sparrow Hawk (<i>Falco sparverius phalana</i>), 1. | |
| V. Northern Raven (<i>Corvus corax principalis</i>), 2. | |
| V. Northwest Crow (<i>Corvus caurinus</i>), 2. | |

NORTH ROCK.

Loc. — Lat. 47° 44' 45" N.; Long. 124° 29' 50" W.; offshore 1½ miles.

Desc. — An inaccessible pillar of barren rock 100 feet or so in breadth, 40 in thickness, and 100 in height; whitened by long use as cormorant rookery, and very picturesque.

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| R. Glaucous-winged Gull, 10. | R. Baird Cormorant, 200. |
| R. White-crested Cormorant, 100-300. | R. Black Oystercatcher, 1 pair. |

ALEXANDER ISLAND.

Loc. — Lat. 47° 47' 40" N.; Long. 124° 30' 30" W.; offshore 1½ miles.

Area. — About 10 acres.

Desc. — A large green-topped, curb-roofed mass of fine conglomerate, about 100 feet high, perpendicular on N., sloping approach on S. Deep embayment on south side of island, with steep sides. Crown with heavy turf, stunted brush, and several dwarfed spruce trees.

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|--------------------------------|----------------------------|
| R. Tufted Puffin, 5000. | R. Baird Cormorant, 300. |
| R. Cassin Auklet, 1000. | R. Black Oystercatcher, 12 |
| R. Glaucous-winged Gull, 50. | R. Rusty Song Sparrow, 6. |
| R. Western Gull, 2. | V. Northern Raven, 2. |
| R. Kaeding Petrel, 1000-10000. | V. Northwest Crow, 2. |

ROUNDED ISLET.

Loc. — Lat. 47° 49' 40" N.; Long. 124° 34' W.; offshore half mile; off Toileak Point SW.

Area. — About 1 acre.

Desc. — A rounded rock mass about 100 feet in height, with dome-shaped green top, dense with vegetation, coarse grass, and dwarf bushes.

Not explored, but known to harbor:

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| R. Tufted Puffin, 500. | R. Baird Cormorant, 200. |
| R. Glaucous-winged Gull, 100. | R. Black Oystercatcher, 1 pair. |

THE GIANTS' GRAVEYARD.

Loc.—Lat. 47° 50' 30" N.; Long. 124° 34'; offshore 100 yards to $\frac{1}{2}$ mile.

Desc.—A group of jagged rocks and pinnacles, some nineteen in number, rising from 40 to 150 feet above tide, and representing the last stages of erosion of a Miocene sandstone set on edge. It is impossible to exaggerate the sharpness or sheerness of some of these headstones but even the wildest, if high enough, affords lodgment for the Gulls and the Baird Cormorants; while the bases of the largest all boast their pair of Black Oystercatchers. Only one rock deserves particular mention:

Ghost Rock.—The northernmost of the group, very bold in outline, higher than wide and narrowing at base. This rock is everywhere white with excrement and is entirely given over to the nesting of cormorants.

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|---------------------------------|--------------------------|
| R. White-crested Cormorant, 50. | R. Baird Cormorant, 100. |
|---------------------------------|--------------------------|

THE QUILLAYUTE NEEDLES.

Loc.—Lat. 47° 33' 4" N.; Long. 124° 39' W.; offshore 100 yards to 1 mile.

Combined areas, 4 or 5 acres.

Desc.—An exceedingly picturesque group of rocks off Tealwhit Head, each possessed of strong individuality, whether pinnacle, oval, sugar-loaf, or flat-top, and each distinguished by appropriate Indian (Quillayute) names, which ought as far as possible to be retained.

Dhuoyuatzachtahl (Place-where-we-catch-Petrels) or *Dhuoyuatz* (Petrel) for short.—The western of two distinct islets, lumped on the chart (Coast and Geodetic Survey, No. 6400) as "Huntington Rock," has a height of over 100 feet and an area of above an acre; is perpendicular on W., N. and E., sloping and climbable on S. E. Crest covered with dense coarse "saw-grass" with surrounding border of turf.

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|------------------------------|----------------------------|
| R. Tufted Puffin, 300. | R. Western Gull, 10. |
| R. Cassin Auklet, 500. | R. Kaeding Petrel, 40,000. |
| R. Glaucous-winged Gull, 10. | R. Baird Cormorant, 20. |

Keeksööstahl ("Landing-place," no longer appropriate).—Companion to last on the east; of practically equal area; nearly inaccessible.

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|-------------------------------|--------------------------|
| R. Tufted Puffin, 500. | R. Baird Cormorant, 100. |
| R. Glaucous-winged Gull, 200. | Kaeding Petrel, ? |
| R. Western Gull, 6. | |

An inaccessible colony of Glaucous-winged Gulls also appears upon Table Rock, 75 yards or so due south of Keeksööstahl.

THE JAMES ISLAND GROUP.

Loc.— Opposite La Push, connected with shore at low tide.

James Island is the ancestral fortress of the Quillayute Indians now resident at La Push. It is heavily timbered except on the eastern end, which is given over to gardening; but its abrupt sides support several small colonies of Baird Cormorants. Of the associated rock masses recently disrupted from James only one, *Kohchāā(uh)*, carries an extensive colony of Baird Cormorants, say 200, with associated Glaucous-winged Gulls. A pair of Peale Falcons tyrannize over this group, and rears its young midway of one of the steepest walls.

CAKE ROCK.

Quillayute name, Chah-chah-lakh-hoos-set.

Loc.— Lat. 47° 55' 50" N.; Long. 124° 41' 30" W.; offshore 2 miles.

Area.— About 10 acres.

Desc.— Elliptical rock mass 115 feet high, with sides nearly perpendicular all around. Flat top with rounded elevation in center, all densely covered with brush and turf. Has been climbed by Quillayutes of passing generation, but now practically unscalable.

R. Tufted Puffin, 500.

R. Baird Cormorant, 100.

R. Glaucous-winged Gull, 1000.

R. Black Oystercatcher, 1 pair.

DÖH'ÖDÄÄLUH.

Loc.— Lat. 47° 57' N.; Long. 124° 41'; offshore half mile.

Area.— About 1 acre.

Desc.— Very diversified rock; a sharp ridge of metamorphic sandstone running to a high point and reappearing in outlier spurs or columns; a little wire-grass on upper levels and slopes.

R. Tufted Puffin, 40.

R. Baird Cormorant, 100.

R. Glaucous-winged Gull, 50.

R. Black Oystercatcher, 12.

R. White-crested Cormorant, 20.

V. Black Turnstone, 1.

CAPE JOHNSON GROUP.

Loc.— Centering Lat. 47° 58' N.; Long. 124° 42' W.; offshore 100 yards to $\frac{1}{2}$ mile.

Desc.— Group of some dozen rocky islets, mostly sharp peaks, of which about half carry small colonies of Gulls and Baird Cormorants, with the omnipresent Oystercatchers at base.

JAGGED ISLET.

Loc.— Lat. 47° 59' 25" N.; Long. 124° 44' W.; offshore about 2½ miles.

Area.— Two or three acres.

Desc.— A long ridge of fantastically eroded sandstone, running substantially parallel to shore line, 200 yards long, about 50 yards wide, 68 feet high. Swept by severe storms and entirely destitute of vegetation. Only central and highest portion of island used by sea-birds,— end frequented by sea-lions.

R. California Murres, 6.

R. Black Oystercatcher, 6.

R. Glaucous-winged Gull, 200.

V. Baird Cormorant, 100.

R. Brandt Cormorants, 50.

WISHALÖÖLTH.

Loc.— Lat. 47° 59' 48" N.; Long. 124° 42' W.; offshore about ¾ mile.

Area.— About 20 acres.

Desc.— A lofty, jagged ridge of metamorphic conglomerate with sharply sloping sides covered with guano ledges and resulting areas of shallow earth, which are clothed with grass and other vegetation — yarrow, painted-cup, and the like; 175 feet high; 200 yards long along crest. One principal outlier and several minor ones on E. of same character.

R. Tufted Puffin, 1000.

R. Baird Cormorant, 100.

R. Glaucous-winged Gull, 2000–3000.

R. Black Oystercatcher, 6.

R. Rusty Song Sparrow, 12.

R. Western Gull, 100–500.

V (?) Rufous Hummer, 1.

R. Kaeding Petrel, 5000–15000.

CARROLL ISLET.

Indian name, Habaht-aylch.

Loc.— Lat. 48° 10' N.; Long. 124° 43' 30"; offshore about 2 miles.

Area.— Ten to fifteen acres.

Desc.— The gem of the Olympiades! A high, rounded mass of sandstone, tree-crowned (20–30 spruces), and with sides chiefly precipitous. The crest is covered also with a dense growth of elder-berry, salmon-berry, and salal brush, while the upper slopes N. and E. are covered with luxuriant grasses. The elevation is nearly 250 feet, and the extraordinary variety of cover attracts every bird known to breed along this coast, save the Rhinoceros Auklet and the Brandt Cormorant, and the latter may be seen from the western crest of Carroll, as it nests on the outlying pinnacle, Paahwoke'-it.

R. Tufted Puffin, 5000.	R. Rufous Hummer, 8.
R. Cassin Auklet, 1000.	R. Rusty Song Sparrow, 12.
R. Pigeon Guillemot, 20.	R. Sooty Fox Sparrow c. 12.
R. California Murre, 700.	R. Western Winter Wren, 8.
R. Glaucous-winged Gull, 1000.	R. Russet-backed Thrush, 4.
R. Western Gull, 50.	V. American Crossbill (<i>Loxia curvirostra minor</i>), 5.
R. Kaeding Petrel, 500.	V. Barn Swallow, 6.
R. White-crested Cormorant, 100.	V. Audubon Warbler (<i>Dendroica auduboni</i>), 1.
R. Baird Cormorant, 500.	
R. Black Oystercatcher, 6.	
R. Peale Falcon, 2.	

PAAHWOKE-IT.

Pinnacle of bare rock, about 75 yards west of Carroll; 125 feet high; inaccessible.

R. California Murre, 200.	R. Brandt Cormorant, 60.
R. Glaucous-winged Gull, 10.	R. Baird Cormorant, 150.

WHITE ROCK.

Indian name, Peechwah'.

Loc.— Lat. 48° 8' 10" N.; Long. 124° 43' 20"; offshore $\frac{3}{4}$ mile.

Area.— About 1 acre.

Desc.— Rock mass about 150 feet high, with abrupt walls and narrow proportions, but with sloping top well grassed. Said to have been scaled by Ozette Indians, but must be very difficult.

R. Tufted Puffin, 200-500.	R. Baird Cormorant, 100.
R. Glaucous-winged Gull, 300-500.	

THE FLATTERY ROCKS.

Loc.— Lat. 48° 10' 45" N.; Long. 124° 45-6' W.; off Cape Alava from $\frac{1}{2}$ to 1 mile.

Area.— Ten to forty acres.

Desc.— Four high islands (about 200 feet elevation), straight in line running W. N. W. from Ozette. Two innermost are wooded and sloping, save that second is precipitous on west end. The two outer are barren rocks with steep sides. Outermost, upon which birds chiefly colonize, may be called *Old Rock*.

R. Tufted Puffin, 500-1000.	R. Black Oystercatcher, 6.
R. Glaucous-winged Gull, 500.	V. Black Turnstone, 1.
R. Baird Cormorant, 500.	

FATHER AND SON.

Loc.— Lat. 48° 13' 50" N.; Long. 125° 43' W.; offshore $\frac{1}{2}$ mile.

Area.— $\frac{1}{4}$ acre.

Desc.— A guano-covered shaft 150 feet high, nearly destitute of vegetation; unscalable. Outlier (the "Son"), 30 feet high, rising from same base at distance of 100 feet N. E.

R. Glaucous-winged Gull, 100. R. Baird Cormorant, 200.

R. White-crested Cormorant, 20. R. Black Oystercatcher, 1 pair.

POINT-OF-THE-ARCHES GROUP.

Loc.— Lat. 48° 15' N.; Long. 124° 43' W.; offshore 0- $\frac{1}{2}$ mile.

Desc.— A series of some thirty conglomerate blocks and shafts, variously undercut and arched, all very bold in outline and arranged chiefly in two parallel groups running west in extension of two prominent headlands. Outermost members of group bear scattered colonies of gulls and cormorants, but only northwesternmost, *Silversides*, heavily populated.

R. Tufted Puffin, 1000. R. Baird Cormorant, 200.

R. Glaucous-winged Gull, 500. R. Black Oystercatcher, 10.

FUCA'S PILLAR GROUP.

Loc.— Lat. 48° 22' 30" N.; Long. 124° 43' 30" W.

Desc.— A series of precipitous outliers of Cape Flattery, typified by Fuca's Pillar, which stands out as sharp-cut and awful as the leaning tower of Pisa. The rocks lying further out are for the most part worn down below the point of safe nesting; but the Pillar proper and its immediate neighbors, together with the adjacent cliffs of the mainland, present unexampled facilities for nesting, being hollowed out by wind action into a perfect honeycomb of recesses and countersunk ledges.

R. Glaucous-winged Gull, 200-500. R. Black Oystercatcher, 12.

R. Baird Cormorant, 1000.

TATOOSH ISLAND.

Loc.— Mouth of Straits of Juan de Fuca.

Desc.— Low-lying, grass-covered, flat-topped, conglomerate rock, with maze of similar outliers. Occupied by Lighthouse and Gov't Wireless Station and imperfectly explored. Would repay closer study.

R. Tufted Puffin.

R. Sooty Fox Sparrow.

R. Cassin's Auklet (?).

R. Barn Swallow.

R. Pigeon Guillemot.

R. Rough-winged Swallow (*Stelgidopteryx serripennis*).

R. Glaucous-winged Gull.

- | | |
|-------------------------|---|
| R. Western Gull. | V. Harlequin Duck (<i>Histrionicus</i> |
| R. Kaeding (?) Petrel. | <i>histrionicus</i>). |
| R. Baird Cormorant. | V. Northwest Crow. |
| R. Black Oystercatcher. | V. Black Cloud Swift (<i>Cypseloides</i> |
| R. Rusty Song Sparrow. | <i>niger borealis</i>). |

Adding the maxima of estimates for the separate islands and groups above enumerated (and this is manifestly fair, in view of all the lesser breeding places disregarded throughout the region), and taking out for the nonce Kaeding Petrel, we have a total of some 46,000 for the adult summer population of the eleven species of sea-birds nesting in the Olympiades. Of the Petrels alone it is safe to say that there are from 55,000 to 100,000 more, making a grand total of upwards of 100,000 sea-birds now harboring in the three refuges recently appointed by President Roosevelt.

AN UNPUBLISHED LETTER OF JOHN JAMES AUDUBON TO HIS FAMILY.

BY RUTHVEN DEANE.

THE following letter is one of unusual interest, as it shows the great author in the height of his vigor and enthusiasm, toiling day and night in the city of Baltimore, Md., soliciting subscriptions for the octavo edition, 1840, of his 'Birds of America.' In this city, as well as in all others where he visited, he not only in a short time made many friends, but the most influential citizens rendered him great service in furthering his object.

At the date this letter was written, about 500 copies of Parts 1 to 5 had been published. The work was principally done in Philadelphia. J. and J. B. Burke, 523 No. Front St., furnished the paper, Edward G. Dorsey, 12 Library St., was retained as the printer for the text, while Edward H. Rau, 85 Dock St., did the binding of the Parts as issued. J. T. Bowen, 12 So. Broad St., furnished the paper for the plates and executed the coloring and printing thereof, his charge being \$34 per hundred. Bowen furnished all the lithographs with the exception of the fifteen plates

accompanying numbers 28, 29 and 30. For some reason these were executed by George Endicott, lithographer, 152 Fulton St., New York. Boston furnished 201 subscribers, Baltimore 168, New York City 132, while New Bedford, Philadelphia, Richmond, Washington, Charleston and New Orleans averaged 51 each.

I am under obligations to Mr. John E. Thayer, Lancaster, Mass., for the privilege of examining a set of seven old account books which were kept by Audubon and his sons during the publication of this work, and also for permission to publish this letter, which was pasted in one of the books containing miscellaneous records, lists of subscribers, etc. Mr. Thayer came into possession of these relics in November, 1906. The total number of subscribers to the octavo edition, 1840, of the *Birds*, as recorded in these account books, is 1090, and for the royal octavo edition, 1852-'54, of the *Quadrupeds*, by Audubon and Bachman, 2004.

Baltimore, Feb. 21st. 1840.

11 o'clock at night.

My dear friends

So far so good, but alas! I am now out of numbers to deliver to my subscribers here. Here! where I expected to procure a good number more. This list is composed of excellent men and all good pay. I have in my pocket upwards of one hundred names,¹ whom I am assured are likely to subscribe. Therefor I will not leave Baltimore for some days to come at least. I forward a copy of this list to Chevalier² by the same mail and yet you may as well inquire if he has received it. More numbers I must have as soon as possible as all my subscribers here are anxious about receiving their copies, unfortunately I had only 90 No. 2. I look upon this list as a capital list. I have sent Mr. Ridgley³ of Annapolis a No. 1 and a prospectus, and expect some names tomorrow evening from that quarter.

¹ On the back of this letter is written the names of one hundred and one subscribers; six of these names were crossed off.

² J. B. Chevalier, lithographer, 70 Dock St., Philadelphia, Pa., in 1839-41. While his name appears on the title page of the first five volumes of the octavo edition, 1840, of the *Birds of America*, he was not a co-publisher with Audubon, but was employed by him as an agent and promoter of the work, not only receiving a commission on sales made by him, but up to a certain time shared in the estimated profits.

³ Probably David Ridgley, Librarian of the Maryland State Library in 1840. Author, *Annals of Annapolis*, 1841.

I will remit money to Phila. and will let you know how much as soon as I can. The box has arrived here safely and tomorrow or Monday I will deliver Biographies¹ &c. Dr. Potter² is very ill and poor and yet I hope to get his note before I leave here.

I received a note from dear Johny³ dated at Norfolk, all well and going on. I expect they are at this moment at John Bachman's. I am fatigued beyond description and had the misfortune last evening of skinning my shin bones, they bled profusely however, and I hope will soon get well, though feel rather sore at this very moment, but I will take care of them.

The amount of attention which I have received here is quite bewildering, the very streets resound with my name, and I feel quite alarmed and queer as I trudge along. Mess. Meckle,⁴ Oldfield⁵ and the Brune⁶ family have all assisted me in the most kind and brotherly manner, indeed I may say that my success is mostly derived from these excellent persons.

I have written to Mr. Mifflins. I feel that Theodore Anderson⁷ will not live long. Mr. Morris⁸ has not yet returned from Annapolis. See that the *notice* in the Baltimore Patriot⁹ which I sent you yesterday is inserted in the *Albion*, the *New York Gazette* and if possible in the *Courier* and *Enquirer*.

¹ The Ornithological Biography. These were sold at \$5.50 per volume.

² Dr. Nathaniel D. Potter of Baltimore. The account books show there was an N. Potter, who was a subscriber to the folio edition.

³ His son John Woodhouse Audubon.

⁴ Robert Meckle, born July 1, 1798, elected cashier of the National Union Bank of Baltimore in 1830, which position he held for forty-eight years. Subscriber to the 1840 edition.

⁵ G. S. Oldfield. Subscriber to the 1840 edition.

⁶ Frederick W. Brune, Sr., born 1776, died 1860. A successful German merchant and shipowner, officer and director in several banks and public institutions, enjoyed a high reputation for enterprise, liberality and honor. Subscriber to the 1840 edition.
John Christian Brune. A man of high commercial honor. Died Dec. 7, 1863. Subscriber to the 1840 edition.

⁷ In the account books is a memorandum that on Feb. 11, 1840, there was forwarded to Col. Theodore Anderson of Baltimore, one set of the large work, half bound, fifteen volumes of the Biography, and thirty copies of the Synopsis.

⁸ Probably George S. Morris of Baltimore, who was a subscriber to the 1840 edition.

⁹ This paper was first issued Sept. 28, 1812. Two years later the name was changed to the Baltimore Patriot and Evening Advertiser.

I have sent one to Chevalier and another to Dr. Parkman.¹ I ought to have at this moment 300 copies Nos. 1, 2, 3, 4, for Washington City and I really think it would be better to stop the publication of the work for *one month* to effect this. Therefor loose no time in urging Mr. Bowen (write to him) and Chevalier also on this all important subject.

If ever I was in want of assistance it is at this moment and *you* my dear Victor must be on the alert and second my endeavors to render you all Happy! I would be delighted to have a few lines from dearest Mamma and Eliza at the end of your next letter, which I hope to receive in immediate answer to this, *Here*. I have marked all your items in your last letter. Call from time to time at the Mercantile Library. I am glad you have remitted to the Rathbone's.² Do write to Mr. Hoppenstall and see the daughter of Capt. Brittan. I was invited last evening to a great ball, and should have gone had not my accident of shin bones prevented me. I am told that I would have had some 20 names there.

Recollect that our agents name is Gideon B. Smith³ and a most worthy man he is, highly recommended by Robert Gilmor⁴ and others.

[This is one of the few Audubon letters which I have seen where the signature was omitted.]

¹ Dr. George Parkman, born 1791, died 1849. One of Audubon's warmest friends in Boston, assisting him in many ways. In a letter which Audubon wrote from London, Nov. 18, 1837, to Dr. Thomas M. Brewer, addressed to "My dear young friend," he says: "I send you enclosed the copy of an advertisement of my work, which I wish you to hand over to our most generous friend George Parkman Esq., M. D., and ask of him to have it inserted in one or more of the Boston newspapers as soon as convenient." The account books show that on Jan. 8, 1840, a box was shipped to Dr. Parkman, containing one set full bound of the large work, *Birds of America*, at \$1075; also one set half bound at \$950, and the *Biography* complete at \$27.50. Dr. Parkman was also a subscriber to the octavo edition of 1840, as well as to the work on the *Quadrupeds*.

² William and Richard Rathbone, the warmest friends Audubon had in England and whose acquaintance he first made in 1826. The "Flycatcher," a drawing made by Audubon in 1826 and presented to Mrs. Rathbone of "Green Bank," Liverpool, England, also the pencil sketch of Audubon drawn by himself, are still in the family. These were illustrated in 'Audubon and his Journals' and Miss M. R. Audubon writes me that she saw them during a recent visit to Liverpool. The Rathbone's still possess the folio edition of the 'Birds of America' with Audubon's presentation autograph in each volume.

³ Gideon B. Smith, M. D., born 1793, died 1867. M. D., University of Maryland, 1840. Editor *Journal of the American Silk Association*, 1839-40. A well known entomologist, authority on the seventeen year locust.

⁴ Robert Gilmor, died Nov. 30, 1848. Extensively connected with mercantile affairs. First President of the Academy of Sciences of Baltimore, when incorporated in 1825. An original subscriber to the folio edition, 'Birds of America,' as well as the octavo edition of 1840.

UNPUBLISHED LETTERS OF INTRODUCTION CARRIED BY JOHN JAMES AUDUBON ON HIS MISSOURI RIVER EXPEDITION.

BY RUTHVEN DEANE.

AUDUBON, like many other people, when travelling in foreign countries or going into new territory, supplied himself with letters of introduction, which always rendered him great assistance in his special objects, and made for him many life-long friends.

It was about a year before he started on the memorable Missouri River Expedition, that he began to correspond and talk up the trip with those whom he had selected to make up his party. At that time he secured letters of introduction and recommendation, but not knowing to whom they would be presented they were necessarily of the "to whom it may concern" type. The following five are of special interest, as they only show further evidence of the very high esteem in which Audubon was held by friends who were prominent in official positions. Copies of these letters were found in the Audubon account books, and I express many thanks to Mr. John E. Thayer, in whose possession they are, for the liberty of publishing them.

I.

United States of America,
Department of State.

To all to whom these presents shall come — greeting.

Know Ye, that the bearer hereof, John James Audubon, a distinguished naturalist and native citizen of the United States, has made known to me his intention of travelling on the continent with the view principally of aiding the cause of science by extending his researches and explorations in natural history, and as he is known to me to be a man of character and honor and worthy of all friendly offices and of all personal regard, these are therefore to request all whom it may concern, to permit him to pass freely, without let or molestation, and to extend to him all such aid and protection as he may need, and which becomes the hospitality of civilized and friendly nations.

In testimony whereof I, Daniel Webster,¹ Secretary of State of the United States, have hereunto set my hand and caused the seal of this department to be affixed at the City of Washington, this the 24th day of July, A. D. 1842.

II.

Washington, 24 July, 1842.

The bearer of this note is Mr. Audubon well known in the world as a very distinguished naturalist who has contributed largely to the amusement and instruction of those who take pleasure in his interesting pursuits, by his publications.

I understand that Mr. Audubon proposes visiting the western part of this great continent and possibly those regions where the British fur trade companies pursue their adventures.

Although the known kindness and hospitality of the managers of these companies render any recommendation or introduction of a gentleman so distinguished wholly useless, I beg to add my testimony of his great merit and of his deserving in every respect all assistance and support that may be given him, as well as for his own sake and for the sake of that science which he is so well qualified to improve and promote. I believe I may add that Mr. Audubon has no other motive whatever for his excursion but the pursuit to which I have alluded.

ASHBURTON.²

III.

Head Quarters of the Army,
Washington, July 25th, 1842.

To the Officers of the
United States Army,
Gentlemen,

This letter may be exhibited to some of you on the remote frontiers. Its object is to bespeak your kind aid and assistance in

¹ Secretary of State, 1841-43 and 1850-52. Born Jan. 18, 1782, died Oct. 24, 1852. A warm personal friend of Audubon, who aided him in many ways and was a subscriber to the folio edition of his 'Birds of America.'

² Lord Alexander Baring Ashburton, born 1774, died May, 1848. An English financier and diplomatist. Sent to the United States in 1841 on a special commission on the subject of a long disputed boundary between Maine and the British Colonies. Daniel Webster praised him highly as a good man to deal with, who could see that there were two sides to a question.

behalf of our distinguished countryman John James Audubon Esq., who is the author of the great work *The Birds of America*, and who is about to illustrate American Science by another, *The Quadrupeds of North America*. Mr. Audubon will probably be accompanied by his younger son,¹ and one or two other assistants.

The object of this note is to ask for the interesting party such courtesies and assistance as they may need in their labors, and which gentlemen of the Army themselves, scientific and liberal, cannot fail to render with pleasure.

With great respect

I remain

Gentlemen

Yrs. truly

WINFIELD SCOTT.²

By the General

R. Jones³

Adjt. Gen^l.

July 25th, 1842.

IV.

Mr. John James Audubon an eminent naturalist and an American citizen, being about to visit our frontiers, he is hereby recommended to the kindness of all who would promote the science of natural history by honoring and assisting one who has devoted himself to it with such ability and enthusiasm, and particularly to the hospitality and protection of all officers and Agents of the War Department, Civil or Military, who [are] specially desired to render to Mr. Audubon and his party any assistance, protection and comfort in their power, not inconsistent with their public duties.

JOHN C. SPENCER.⁴

War Department,

July 25th, 1824.

¹ John Woodhouse Audubon. He did not, however, accompany his father. The party was made up of Edward Harris, Isaac Sprague, John G. Bell, and Lewis Squires. The Expedition occupied the period between March '11, 1843, and Nov. 6, of the same year.

² General Winfield Scott, born June 13, 1786; died May 29, 1866. In 1841 he became Commander in Chief of the Army of the United States.

³ Roger Jones, born 1787, died July 15, 1852. He was appointed Adjutant General of the Army March 7, 1825.

⁴ John Canfield Spencer, born 1788, died May, 1855. Secretary of War from October 12, 1841, to March, 1843, when he became Secretary of the Treasury.

V.

United States of America,
Washington, 28th July 1842.

The bearer of this, John James Audubon, is a native citizen of the United States, who has informed me of his intention of travelling on the continent of America, chiefly to promote the cause of science by researches in natural history. He is known to me to be a naturalist of eminent acquirements and estimation, a man of character and honor and worthy of all personal respect and regard. I recommend him to my countrymen abroad and to the authorities and inhabitants of other countries that he may receive the friendly offices, aid and countenance which are due to the interests of science and the rites of hospitality among civilized nations.

JOHN TYLER,¹

President of the U. States.

LIST OF THE BIRDS OF LOUISIANA. PART IV.²

BY GEO. E. BEYER, ANDREW ALLISON, AND H. H. KOPMAN.

64. ROSEATE SPOONBILL (*Ajaia ajaia*). The only locality in the State where this species is now positively known to occur is the region about Lake Arthur, in southwest Louisiana. Material collected in this locality in 1894 is now in the museum of Tulane University. Spoonbills are reported to be resident in the Lake Arthur region. Their nesting places are in the heavy river and lake swamps of Cameron and Calcasieu Parishes. Two specimens were shot on the Mississippi River about five miles below New Orleans in December, 1884.

65. WHITE IBIS (*Guara alba*). A common resident, especially in swampy sections of the southern part of the State. In the latter part of summer it is not an uncommon sight in the less settled portions of the State to see long files or irregular flocks of this species, containing about

¹ John Tyler, Tenth President of the United States, born March 29, 1790; died January 18, 1862.

²For Parts I and II, see Volume XXIII, pp. 1-15, 275-282; for Part III, see Volume XXIV, pp. 314-321.

equal numbers of adults and young birds, moving at evening from the feeding grounds, and in the mornings returning from the roosts. Local (Creole) name: Beccroche (Crooked bill).

66. SCARLET IBIS (*Guara rubra*). The occurrence of this species in Louisiana as noted by Audubon is the only reliable record of which we have knowledge. A specimen in the State Museum in New Orleans prepared, by a New Orleans taxidermist, is said to have been killed in Louisiana about 1888, but the chain of testimony in this particular case is imperfect.

67. GLOSSY IBIS (*Plegadis autumnalis*). A resident in the same section as the Roseate Spoonbill, but not as common as the following species.

68. WHITE-FACED GLOSSY IBIS (*Plegadis guarauna*). Resident and breeding in southwest Louisiana. Several small flocks at Lake Prieu, Calcasieu Parish, in September, 1898 (Beyer).

69. WOOD IBIS (*Tantalus loculator*). Appears to be growing rarer every year. Occurs in the vicinity of heavy swamps in various parts of the State. Two nesting colonies of about 40 birds each were formerly observed in St. Tammany Parish on the Bedico and Bogue Chitto Rivers (Beyer), while it has been seen in summer in Cameron Parish, in southwestern Louisiana, and in Madison Parish, diagonally across the State. In the latter section there are some very deep swamps, and considerable numbers were noted there in July, 1896 (Kopman). The nests of the colonies noted in St. Tammany Parish were bulky and formed of large dry sticks, placed at an elevation of 25 or 30 feet, directly over a waste of mud and water. The flock composing one of these colonies was seen using two tall dead tupelos as roosting places later in the season, beginning about August 1. Wood Ibises were seen at Lake Catherine, La., in October, 1904.

70. AMERICAN BITTERN (*Botaurus lentiginosus*). Breeds in limited numbers; common as a winter resident. Local (Creole) name; Gaze-Soleil (Sun-gazer).

71. LEAST BITTERN (*Ardetta exilis*). An abundant resident in the marshes of the coast; more conspicuous, and doubtless more abundant, in summer than in winter. Has been noted also in summer about the marshy edges of heavy swamp lakes in northeastern Louisiana (Madison Parish). Nesting begins the latter part of April, in the latitude of the Gulf Coast. This species is commonest along the borders of bayous in the marsh.

72. GREAT BLUE HERON (*Ardea herodias*). A common resident in all sections of the State. It is most plentiful, of course, in marshy and swampy sections, and about large expanses of water. Large numbers are never seen in one locality as with the smaller herons.

73. AMERICAN EGRET (*Herodias egretta*). A resident, but less common in winter than in summer. Is growing less common. Occurs along the coast and at suitable localities inland.

74. SNOWY HERON (*Egretta candidissima*). It has been at least twenty years since this species has occurred in any considerable numbers. A few

pairs were seen on East Timbalier Island in June, 1907, where apparently they were breeding with the large colony of Louisiana Herons. East Timbalier is now a government reservation. A colony at Avery Island is given protection by E. A. McIlhenny. It is doubtful whether this species ever wintered in large numbers in Louisiana.

75. REDDISH EGRET (*Dichromanassa rufescens*). Rather common as a breeder along the coast, but disappearing more or less completely in winter.

76. LOUISIANA HERON (*Hydranassa tricolor ruficollis*). This species breeds chiefly in the grass and bushes of several islands off the Louisiana coast instead of in swamp "rookeries" on the mainland, as in the case of the other species. There are large colonies at East Timbalier and other islands. The colony at East Timbalier numbers about 1750. Nearly all stages of nesting were observed when this colony was visited early in June, 1907.

77. LITTLE BLUE HERON (*Florida cærulea*). This is the commonest of the herons of Louisiana; in winter, however, it is almost entirely absent. It arrives at the latitude of the coast early in March. The flocks of returning migrants are usually small, and single birds are frequently seen. Long irregular flocks, with white birds usually preponderating, are seen traveling over well defined routes at the approach of autumn. The spring birds, when the species first returns, are most frequently seen on cloudy and windy days, traveling at a considerable height. This species is undoubtedly one of the commoner large migrants at night throughout much of the spring, especially on wet nights or when stormy weather prevails. The favorite resorts of the Little Blue Heron are heavy swamps rather than open marshes. Rookeries occur at various localities throughout the wetter parts of the State. One that lies a few miles south of New Orleans is situated where swampy woods give way to fresh water marsh. The nests are chiefly in willows. Yellow-crowned Night Herons are included in the same colony. Nesting is usually well under way by May 1.

78. GREEN HERON (*Butorides virescens*). The Green Heron does not arrive in Southern Louisiana in large numbers until the end of March. The migration appears to be performed entirely at night. Great numbers may usually be heard on wet or windy nights throughout April. This species is about as common in suitable localities inland as near the coast.

79. BLACK-CROWNED NIGHT HERON (*Nycticorax nycticorax naevius*). This species is commoner in winter than in summer, but it has been found breeding in the vicinity of Lake Maurepas (Beyer), and has been found on East Timbalier Island early in June (Kopman).

80. YELLOW-CROWNED NIGHT HERON (*Nyctanassa violacea*). Chiefly if not exclusively, a summer visitor, arriving the end of February or early in March, and being heard in night migration with the other herons throughout the spring. In summer, also, the voice of this bird may be frequently heard at night, movements to and from the feeding grounds apparently occurring with great frequency during the hours of darkness. The swamps

of the southern section of the State are preëminently the home of this species; it is most frequently found feeding on the borders of wet woods, but sometimes in their depths, as well as about canals and ditches on cultivated lands, and along bayous in the marsh. Local (Creole) name: Grosbec.

81. WHOOPING CRANE (*Grus americana*). A winter bird, visiting the coast in considerable numbers.

82. SANDHILL CRANE (*Grus mexicana*). Resident on the coast, frequently occurring there in large numbers.

83. KING RAIL (*Rallus elegans*). Chiefly a winter bird, but probably breeds in fresh or brackish marshes near the coast, and at suitable localities in the interior of the State, as about the marshy edges of the lakes and swamp sloughs in the north central and northeastern sections of the State.

84. LOUISIANA CLAPPER RAIL (*Rallus crepitans saturatus*). This is the common rail of the coast, where it is extremely abundant. It occurs in fresh or brackish marshes a short way from the coast as well as in marshes bordering directly on salt water. It occurs along the Mississippi River as far north as the upper quarantine station. Nesting begins fairly early and the young birds are out of the egg by the first of June or even earlier.

85. VIRGINIA RAIL (*Rallus virginianus*). A common winter visitor, frequenting almost any wet place where there is suitable cover. It has been seen at New Orleans as late as April 7. It arrives in southern Louisiana about October 1.

86. SORA (*Porzana carolina*). While not breeding in Louisiana, this species is very common there throughout a large part of the year. It reaches the rice fields, especially those along the lower course of the Mississippi, by the middle of August, and becomes very abundant in September. It winters in smaller numbers, and grows common again in spring. Most leave by the first week in April, but a few are seen until end of the month.

87. YELLOW RAIL (*Porzana noveboracensis*). Fairly common in winter, especially in rice fields. Birds of this species are sometimes caught by hunting dogs.

88. PURPLE GALLINULE (*Ionornis martinica*). Resident, but rare in winter. Commonest near the coast, being found along bayous through the marshes and swamps, about rice fields where the ditches and canals are fringed by heavy growths of weeds, rushes, and grasses, and even about the marshy edges of lakes and swamp sloughs in the interior of the State. The main body of this species in Louisiana is chiefly migratory, and in the case of the few resident individuals there is considerable local movement in winter. Nesting usually starts the latter part of April. Many nests with fresh eggs have been found on the Company's Canal, near New Orleans, on April 28. Local name: Blue Rail.

89. FLORIDA GALLINULE (*Gallinula galeata*). While occurring in the same localities as the Purple Gallinule, this species is found more in open marshes where the cover is not so dense than in places frequented by the Purple Gallinule. However, it has been found nesting commonly in

marshy growths about the edges of swamp sloughs in northeastern Louisiana. About little pools in the marshes to the east of New Orleans, especially about Lake Borgne, Lake Catherine, etc., this species may frequently be taken unaware while swimming or walking over the muddy edges to the pools. As many as 8 or 10 together may sometimes be seen under these circumstances. The nesting of the Florida Gallinule appears to occupy about the same period as that of the Purple Gallinule. Fresh eggs may be found as late as July 1. The numbers of this species are much reduced in winter. Local (Creole) name: Ralle Poule d'eau.

90. AMERICAN COOT (*Fulica americana*). Very abundant in winter, and a few may breed. Individuals have been seen as late as May 18, with Blue-winged Teals. Unobstructed water surfaces are preferred by this species. It reaches southern Louisiana in large numbers about Oct. 1. The majority leave before the middle of March. Local (Creole) name: Poule d'eau.

91. WILSON'S PHALAROPE (*Steganopus tricolor*). Rather an unusual migrant.

92. AMERICAN AVOCET (*Recurvirostra americana*). A migrant only. A specimen was taken on Bayou St. John, near New Orleans, Nov. 12, 1889, at almost the identical spot where Audubon took one of his specimens (Beyer).

93. BLACK-NECKED STILT (*Himantopus mexicanus*). Resident, but commoner in winter. It is found rather generally in open wet places in the southern section of the State, but never in large numbers.

94. AMERICAN WOODCOCK (*Philohela minor*). Fairly common in suitable localities in winter, but growing steadily less so; it has been found breeding in the State. A young one was retrieved by a dog near Covington on January 29, 1890. Mating birds had been observed during the middle of January near Madisonville (Beyer). Local (Creole) name: Bécasse.

95. WILSON'S SNIPE (*Gallinago delicata*). Most abundant during spring and fall. Its occurrence during winter is extremely irregular; occasionally it is found in considerable numbers in either December or January. The greatest numbers are present during October and part of November and again after the middle of February until the early part of April. The heaviest migration usually occurs the latter part of March. A few are seen even until the early part of May. Returning individuals may be found by September 1 or even earlier. Open marshes, wet pastures, and rice fields are the favorite resorts of this species in Louisiana. Local (Creole) name: Bécassine.

96. DOWITCHER (*Macrorhamphus griseus*). Associated with the following, but not so common.

97. LONG-BILLED DOWITCHER (*Macrorhamphus scolopaceus*). Abundant as a winter resident along the coast and in other suitable localities. This species arrives from the north by August 15 or earlier. Lingered individuals have been seen on the coast until the early part of June, and it is not only probable but practically certain, as in the case of various

other species of Limicolæ, that non-breeding individuals are present in Louisiana all summer. Local (Creole) name: Dormeur.

98. STILT SANDPIPER (*Micropalama himantopus*). Has not been observed in recent years. Specimens have been taken during migration in the past.

99. KNOT (*Tringa canutus*). This species is rare in Louisiana. Specimens in the Kohn collection at Tulane University, New Orleans, were taken at Grand Isle March 28 and April 2.

100. PECTORAL SANDPIPER (*Actodromas maculata*). A very common migrant, occurring in wet pastures as well as on mud flats along the coast and in the marshes. Arrives at the latitude of New Orleans the first week in March, and is present in large numbers late in March and early in April, while it continues present in limited numbers even until May 15 or 20. Returns to Louisiana during the latter part of July. The fall migration is usually completed by October. Local name: Cherook.

101. WHITE-RUMPED SANDPIPER (*Actodromas fuscicollis*). Its movements agree rather closely with those of the preceding, but it is not very common except on the remoter islands of the coast, as Chandeleur, Breton, East Timbalier, and Last Island, where shore birds of all descriptions abound in migration, and where some kinds not breeding in Louisiana may be seen throughout the summer. The White-rumped Sandpiper has been seen on East Timbalier early in June.

102. BAIRD'S SANDPIPER (*Actodromas bairdii*). An uncommon migrant.

103. LEAST SANDPIPER (*Actodromas minutilla*). Very common during migration, arriving usually in August, being found sparingly in winter, and lingering until late in spring. It is a bird of the coast rather than of inland waters and wet places in the interior.

104. RED-BACKED SANDPIPER (*Pelidna alpina sakhalina*). Occurs in winter, as well as during the migrations, along the coast, and has been taken at Freshwater Bayou, Calcasieu Parish, in January (Beyer). Has been noted at Cameron, in the same parish, as late as May 25 (Kopman).

105. SEMIPALMATED SANDPIPER (*Ereunetes pusillus*). A very common migrant, especially on the coast. It returns from the North in considerable numbers by the end of July; but does not appear to linger so late in spring as the Least Sandpiper.

106. SANDERLING (*Calidris arenaria*). A rather common migrant, found chiefly or entirely along the coast. Migrants return from the North early in August. Has been seen at Cameron on June 30, but the individuals noted in this case were doubtless non-breeding birds that had been present since spring. Lingers in the spring, and has been seen during the last of May.

107. MARBLED GODWIT (*Limosa fedoa*). Not especially common; chiefly a migrant, but also found on the coast in winter.

108. HUDSONIAN GODWIT (*Limosa hæmastica*). Not common; specimens in the Kohn collection were taken at Vinton, Calcasieu Parish, on April 22, 1895, and at New Orleans, September 27, 1895.

109. GREATER YELLOW-LEGS (*Totanus melanoleucus*). Occurs in winter as well as during the migrations; often found in large numbers on the coast. Local name: Klook-klook.

110. YELLOW-LEGS (*Totanus flavipes*). Movements about the same as those of the preceding species, but wintering in smaller numbers. Migrants appear in Louisiana early in March, and are commonest the latter part of that month and for a while in April. It returns to Louisiana about August 1. Local name: Klook-klook.

111. SOLITARY SANDPIPER (*Helodromas solitarius*). Very common as a migrant throughout the State, especially in the lowlands. The earliest date of arrival at New Orleans in spring is March 9, and the average date is March 15. It becomes very common by April 1 or even earlier, and is seen in numbers until the latter part of the month, and has been seen as late as May 6. The return of this species has been noted on July 9; it is extremely common in August and for the first half of September.

112. WESTERN WILLET (*Symphemia semipalmata inornata*). A common resident on the coast, especially in the southwest. On the marsh prairies in Calcasieu Parish it is extremely tame.

113. BARTRAMIAN SANDPIPER (*Bartramia longicauda*). Not known to breed in Louisiana, but it is present until late in the spring (May 19), and returns by the middle of July. It does not winter, and disappears by the middle of October or earlier. The first in spring has been noted at New Orleans on March 9. It is common by April 1 or earlier. It is found chiefly in fields and pastures. It is much esteemed as a game bird and goes locally by the name "Papabotte."

114. BUFF-BREASTED SANDPIPER (*Tryngites subruficollis*). Occurs as a rare migrant, said to be more common in winter on the coast. Two specimens were taken from a flock of eight on the outskirts of New Orleans in October, 1887. Other specimens have been taken in October.

115. SPOTTED SANDPIPER (*Actitis macularia*). Common as a migrant, breeding in limited numbers, and possibly wintering in small numbers. Its migrations begin later in spring than those of most of the other species. It is not usually seen at New Orleans until April, and is commonest after the 10th or 15th of that month, disappearing more or less completely by the early part of May; it has been found breeding, however, on several of the drainage canals about New Orleans (Beyer). It is common as a migrant again by the end of July, and so remains until the middle or latter part of September.

116. LONG-BILLED CURLEW (*Numenius longirostris*). Probably breeds on the Louisiana coast in limited numbers; has been seen at Cameron on July 1. It is common at some coast localities in winter.

117. HUDSONIAN CURLEW (*Numenius hudsonicus*). Winters sparingly on the coast and is rather common as a spring and fall migrant. Has been noted at Sabine Pass as late as May 20 (Kopman).

118. ESKIMO CURLEW (*Numenius borealis*). A migrant only, now rare if not absent, but formerly common for a short while in spring and fall.

119. BLACK-BELLIED PLOVER (*Squatarola squatarola*). Common on the coast during migration, having been noted on Timbalier Island in March, and as late as the first of June. It has been found in considerable numbers on Grand Island in August and September.

120. GOLDEN PLOVER (*Charadrius dominicus*). The principal migration of this species in spring occurs between April 1 and April 15, though individuals have been seen on the coast during the late spring and early summer; the latest date recorded is Shell Islands, off Bastian Bay, June 10, 1907 (Kopman). In fall it has been seen on Grand Island in considerable numbers in September.

121. KILLDEER (*Oryzochus vociferus*). Breeds in Louisiana in limited numbers, even in the southern part of the State. Abundant in winter; numbers reach the southern part of Louisiana about Nov. 1, the first migrants arriving about Oct. 10. Few are to be found in the southern part of the State after March 10.

122. SEMIPALMATED PLOVER (*Egialitis semipalmata*). Common during migration, especially along the coast, and wintering there in smaller numbers; the spring migration occurs chiefly during April; the return from the north occurs the latter part of July.

123. PIPING PLOVER (*Egialitis meloda*). A rare migrant. One specimen was obtained on Lake Pontchartrain in October, 1893 (Beyer).

124. BELTED PIPING PLOVER (*Egialitis meloda circumcincta*). A common migrant on the coast, especially on the chain of islands from Last Island to East Timbalier. This species has been observed on these islands through a considerable part of June. It frequents the sandy parts of such islands beyond the reach of the tide. In such locations it is the most conspicuous bird figure, and its notes may be heard almost continuously.

125. SNOWY PLOVER (*Egialitis nivosa*). Fairly common in some seasons on Grand Island and similar islands during migration.

126. WILSON'S PLOVER (*Oethodromus wilsonius*). The Louisiana coast lacks the favorite situations of this species — the beaches of "sharp" white sand, such as occur on the eastern Gulf Coast; and consequently the Wilson's Plover is found in rather small numbers along the Louisiana Coast. It is probably resident wherever occurring.

127. TURNSTONE (*Arenaria interpres*). A rather common resident on the coast.

128. AMERICAN OYSTERCATCHER (*Hematopus palliatus*). Is growing constantly rarer. The last seen were noted at Grand Island Sept. 9, 1900 (Beyer).

THE PASSENGER PIGEON (*ECTOPISTES MIGRATORIUS*) IN CONFINEMENT.

BY RUTHVEN DEANE.

IN 'THE AUK' (Vol. XIII, 1896, p. 234), I published an account of 'The Passenger Pigeon in Confinement,' based on a flock of fifteen birds, some of which had been in possession of Mr. David W. Whittaker of Milwaukee, Wis., for several years. Mr. Whittaker raised this flock from a pair of young birds which he received from a young Indian who trapped them in Shawano County in northeastern Wisconsin.

Between the time of my inspection of the pigeons (March 1, 1896) and the spring of 1897, the whole flock was purchased by Prof. Charles O. Whitman of the University of Chicago, but the following year he returned seven of the birds to Mr. Whittaker. My sincere thanks are due to Prof. Whitman for furnishing me with the following detailed memoranda of the increase and decrease of the flock which remained in his possession until the winter of 1907, when the last bird died.

"1896.— On March 14, purchased three Passenger Pigeons from David W. Whittaker of Milwaukee, Wis. (1♂; 2 ♀). In October purchased another pair from the same flock.

"1897.— In March purchased the balance of the flock consisting of ten birds, thus giving me the entire flock of fifteen birds. During this year nine young were hatched but only four lived, giving me a flock of nineteen.

"1898.— Gave seven birds back to Mr. Whittaker and from the twelve remaining five eggs were hatched, but only two of the young lived, leaving me with a flock of fourteen.

"1899.— Fifteen eggs were laid from February 24 to April 17, but none of these hatched, although five or six developed to the point of hatching. From April 21 to 23, four more eggs were laid and three of these hatched, but the young all died. May 28, took the flock to Woods Hole, Mass., but no more eggs were laid; thus 1899 proved fruitless.

"1900.— During this year fewer eggs were laid and not a single young was raised.

"1901.— Between April 24 and August 25, seven eggs were laid and all of these hatched, but two died. During the latter part of this year three grown birds died.

"1902.— Started the year with a flock of sixteen birds (8 ♂, 8 ♀). Six eggs were laid, one hatched May 29, the young living until October 21. Two old birds (♀) escaped from the pen while at Woods Hole, Mass., and one (♀) was sent to the Gardens of the Cincinnati Zoölogical Co., leaving a flock of thirteen birds (8 ♂, 5 ♀).

"1903.— The birds began mating in January. Two males died of tuberculosis, leaving six males and five females. Only one pair mated and built a nest, but the female produced no egg.

"1904.— Some nests were again made, no eggs being deposited, however. One pair laid twice but the eggs developed for only a few days, then halted. Evidently this means that the stock is getting weak. During the year four males and one female died, leaving a flock of six (2 ♂, 4 ♀).

"1905.— One nest built but no egg laid, the female had evidently lost her power to produce even an unfertile egg. Another female, by the same male, produced a good egg which hatched under a pair of hybrids, but the young lived only twelve days.

"1906.— Two males and two females died, reducing the flock to two females.

"1907.— The two remaining females died of tuberculosis during the winter. I have two male hybrids, between a male Passenger Pigeon and the common cage Ring Dove (*Turtur risorius*). So far as tested, these hybrids have proved unfertile."

Of the seven birds returned to Mr. Whittaker in 1898, four males are still alive, and on October 25, 1907, I visited Milwaukee for the express purpose of again seeing these birds.

For some time they have been in charge of Mr. A. E. Wiedring, to whom I am much indebted for courtesies and information. I found two of the birds in fine plumage, the other two not having quite completed the moult. Mr Wiedring stated that they were apparently in a healthy condition and that he fed them almost entirely upon seeds and farinaceous food. In the spring he frequently fed them on angleworms, of which they are particularly fond, and in this respect differ entirely from the domestic pigeons. The only remaining female of the flock died the previous year,

probably of tuberculosis. In a letter from Mr. Wiedring under date of Feb. 13, 1908, he informs me that the pigeons have been in good condition since my visit the previous October, and that in about a month the birds will begin to get very restless, which is ascribed to the approaching breeding season.

For years we have known of the Passenger Pigeons in the Gardens of the Cincinnati Zoölogical Co., and I am much indebted to Mr. S. A. Stephan, General Manager, for the following report of their flock, in a letter written November 9, 1907.

"The original flock, which came from Michigan in 1875, consisted of twenty-six birds, about half males and half females. A short time later, however, five or six of these escaped. They have bred from time to time and we have raised about twenty-three birds. In no instance has more than one egg been deposited at a time. At the present time our flock has been reduced to three, one male from the original flock, now about twenty-three years old, one male, which we raised, is about eighteen years old, and one female that we obtained from Prof. Whitman's flock in 1902, which is about twelve years old. We have never detected any particular disease which has caused the decrease of the flock, but have attributed it in most cases to old age."

The remnants of the Milwaukee and Cincinnati flocks now number but seven birds (6 ♂, 1 ♀) with little or no chance of any further reproduction.

As a sufficient time has now passed since there has been an undisputed record of a flock, or even a single bird, having been seen, those who have given this subject much attention, are forced to believe that this noble bird, in its wild state, is now extinct. Every little while reports appear in the press or sporting papers, that our Wild Pigeon has again been seen, but we have no specimen or facts to verify the record. How many times have I run down some of these reports, only to find them to be cases of either mistaken identity—Turtle Doves—or humbugs. It is hard to believe that this bird, which within a comparatively short time traversed the country in countless numbers, has been wiped off the face of the earth through the agency of man, yet when we read the mass of evidence which Mr. W. B. Mershon has brought together in 'The Passenger Pigeon,' of the wholesale slaughter which has been going on for so many years, we stop and wonder.

RANDOM NOTES ON THE DISTRIBUTION OF SOME
COLORADO BIRDS, WITH ADDITIONS TO THE
STATE AVIFAUNA.BY HORACE G. SMITH.¹

SINCE the publication of Prof. W. W. Cooke's 'Birds of Colorado' some additional information has been obtained relative to the distribution and breeding habits of some species whose range at that time was but little known, so far as the State of Colorado was concerned.

Through connection with the State Historical and Natural History Society, the writer has had opportunities, both to collect and examine a number of specimens from various localities within the State, and presumes the following notes will be of interest to bird students at this time. Unless otherwise stated, the specimens referred to were donated to the museum by the persons whose names appear in connection with the information given. Others were taken by Curator William C. Ferril and the writer, while on short collecting trips, and in this connection it may be well to state that usually but one to three days were spent in any one locality. Had time been available for more continuous and thorough work, additional facts would doubtless have been secured. My thanks are due Prof. Robert Ridgway of the National Museum, also to members of the staff of the Biological Survey, who kindly examined some of the more difficult subspecies.

Harelda hyemalis. OLD-SQUAW.—Three more specimens, now in the State collection, may be recorded for the State. One was shot at Loveland, Colo., Oct. 16, 1898; another at Calkins Lake, near Longmont, Oct. 23, of the same year. Both were probably males and were taken by Mr. Bryan Haywood. A later specimen, a male, was secured by Judge Park, at Longmont, about Nov. 20, 1903.

Oidemia deglandi. WHITE-WINGED SCOTER.—A male was taken at La Salle, Weld Co., Oct. 24, 1904, and presented to the museum by Mr. H. G. Clark.

Oidemia perspicillata. SURF SCOTER.—Two specimens, both males,

¹ Assistant Curator, State Historical and Natural History Society, Denver, Colorado.

were donated to the museum, one having been taken by Mr. L. B. Meek, at Barr, Adams Co., Oct. 22, 1899; the other secured at Loveland, Larimer Co., by Mr. H. A. Fynn, Oct. 31, 1899.

Nycticorax nycticorax nœvius. BLACK-CROWNED NIGHT HERON.—Early in January, 1903, Mr. T. L. Monson brought in a young male of this species, which he shot from a tree near Fort Lupton, Weld Co., some time between December 20 and 24, 1902. Mr. L. J. Hersey, who has had much experience with this species at Barr Lake, Colo., has no fall records later than October, except in case of crippled birds. In preparing this specimen the writer made special search for casualties of this kind, but found none. Though the bird had not moulted, it was fat and in good condition. The stomach was empty.

Strix pratincola. BARN OWL.—Two more captures for the State may be recorded, both being females. The first was shot from the balcony of the State House, by Patrick Boyle, head janitor of the building, March 29, 1907, and presented to the State Historical Society. A short time previously Mr. Boyle called my attention to some "pellets" which were scattered about the upper balconies. Explanation of their tell-tale presence, supplemented by suggestions to be on the watch for the owl, resulted in its capture. The second specimen was shot by the writer at Holly, Prowers Co., May 24, 1907. It was startled from its roosting place in thick brush on the Arkansas River. The stomach contained the remains of a small rodent.

Otus asio maxwelliæ. ROCKY MOUNTAIN SCREECH OWL.—In 1905, while stopping with the family of Mr. H. D. Boyes on Dry Willow Creek, Yuma Co., we learned that a small eared owl had reared a brood of young in a hole in the perpendicular bank of the creek, about half a mile from the farm house. Accordingly on our trip in 1906 we made special search in hopes of securing specimens which would decide the question as to the variety to be found here. On June 9, a male was secured while roosting under the upturned roots of a large fallen cottonwood tree. The latter was examined by both Mr. H. C. Oberholser and Prof. W. W. Cooke, the latter writing me that it is quite typical of the above subspecies.

Dryobates villosus villosus. HAIRY WOODPECKER.—On June 9, 1906, the writer took a pair of this species near Boyes's Ranch, Dry Willow Creek, Yuma Co., which, so far as we know, are the first records for the State. The actions of the birds, as well as the state of plumage, bore evidence that they were nesting in the neighborhood, but as it was then growing late, search for the nest on that day was impossible. The writer intended to return later and make thorough search, but unfortunately had to leave the locality before doing so. At least one other specimen was afterward seen, about half a mile from the first locality. The skins were sent to the Biological Survey for verification, and were so marked by Mr. Oberholser, who, Prof. Cooke informs me, pronounced them, "nearer the eastern than the Rocky Mountain bird."

Myiarchus cinerascens. ASH-THROATED FLYCATCHER.—A young male

was taken by the writer at Pagosa Junction, Archuleta Co., August 8, 1904. The plumage would indicate that it was probably reared in the neighborhood, but further search was impossible, owing to my leaving the place soon afterward.

***Pica pica hudsonica*.** BLACK-BILLED MAGPIE.—Col. N. S. Goss, in his 'Birds of Kansas,' records this species as "an occasional fall and winter visitant in western Kansas." We have records from several points near the eastern State line of Colorado, Mr. Ferril, Curator of this society, having seen three at Julesburg, Sedgwick Co., Feb. 22, 1907, and later on Sept. 19, saw two in company with Blue Jays. Mr. H. D. Boyes tells me a pair was occasionally seen the past winter, near his ranch on Dry Willow Creek, south of Wray, Yuma Co. This is its first appearance according to his experience during a residence of about 20 years at that place. The writer several times saw half a dozen or more at Holly, Prowers Co., while collecting there the last week in December, 1907, and the remains of others have previously been seen in the brush heaps of wood rats at this locality.

***Cyanocitta cristata*.** BLUE JAY.—Some additional knowledge of this species has been gained since the records from Yuma Co., given in 'The Auk' (Vol. XXII, p. 81, 82). The writer has taken other specimens at Wray, and has since found it much more common at Dry Willow Creek, southeast of that place, where specimens were also taken. Several nests were seen in the tall cottonwoods surrounding the home of Mr. H. D. Boyes, and as a matter of fact, half a dozen nests to the mile, usually covered by incubating birds, could be seen up and down the creek, the first week in June, 1905.

Two sets of eggs were taken June 4, 1905. One nest about seven feet from the ground in a dead black willow, overgrown with grape vines, contained five slightly incubated eggs; the other about 25 feet up in a cottonwood tree, held four eggs in which incubation had progressed about one fourth. The birds were flushed in both instances. Mr. Boyes informs me that the species was not uncommon about the ranch the past winter.

It is also found in other eastern counties of the State, Mr. Ferril having shot two from a flock of half a dozen at Julesburg, Sept. 19, 1907. He was also told that it bred there. In the southeastern portion of the State, it is apparently less common. The writer saw one southwest of Holly, Colo., in the forenoon of May 24, 1907. In the afternoon of the same day a female was shot about a mile from the same locality near town, possibly the same bird.

***Dolichonyx oryzivorus*.** BOBOLINK.—We have a male, taken in Middle Park, near the Troublesome River, by the late Prof. A. M. Collett, on July 11, 1897.

***Icterus spurius*.** ORCHARD ORIOLE.—May 28 to June 9, inclusive, 1905, the writer made collections in Yuma County. June 3-9 were spent at Boyes's ranch on Dry Willow Creek, some ten or twelve miles southeast of Wray. Among the surprises met with in this region was the Orchard Oriole, which was found to be quite common and apparently breeding.

The males were seen daily, and heard in full song, in every grove; the females were less often noticed, possibly on account of their less conspicuous plumage, or because incubating.

A female was seen carrying nesting material, but as she flew quite a distance the location of the nest was not discovered. Several males and one female were taken. June 5-15, 1906, again found the writer in the county, part of the time being spent with Mr. Boyes. The experiences of the preceding year were repeated with additional information on nesting, several nests being discovered among the topmost branches of the trees, where they were quite inaccessible. Further specimens were also taken. Although Curator Ferril and the writer have spent considerable time in the vicinity of Wray, during the migrations, the species was only met with in the locality mentioned.

Icterus galbula. BALTIMORE ORIOLE.—In the same locality and under similar conditions, this species was also found by the writer, two males having been taken near Boyes's ranch, June 4 and 5 respectively, 1905. Females were also seen but not secured. In 1906 several pairs were seen, and a few hours watching was rewarded by the discovery of a nest, containing five recently hatched young and one egg, which, together with the female parent were taken June 14, 1906, and are now in the State collection. The male was seen at the nest but escaped capture. Our experience would indicate that the species was a not uncommon resident on Dry Willow Creek, Yuma Co., during the years 1905 and 1906, and in all probability may be found there every summer.

I may add that Bullock's Oriole is common there also, which fact made it quite difficult to estimate the relative abundance of the two species, the more so as they usually kept in the higher branches of the taller cottonwood trees, which were kept in motion by a stiff breeze that prevailed most of the time during my stay there. This I believe is the first authentic breeding record for Colorado.

Coccothraustes vespertinus montanus. WESTERN EVENING GROSBEAK.—As the breeding range of this species in Colorado is not yet well defined, it may be well to mention a brood of four or five, just out of the nest, that were seen by Howard S. Reed, July 22, 1898, in "California Park, Elk Head Mountains, Routt Co., Colo." One of the family was taken, and is now in Mr. Reed's collection.

Zonotrichia querula. HARRIS'S SPARROW.—A female, shot by W. C. Ferril, October 9, 1907, about two miles east of Kit Carson, Cheyenne Co., along the line of the Union Pacific Railway track. It was in company with a small party of Western Tree Sparrows, Western Vesper Sparrows, etc., and the only one seen. They were near a culvert and probably attracted by a patch of rank weed vegetation, which had grown up at that point.

Junco hyemalis oregonus. OREGON JUNCO.—A specimen of this variety was taken by the writer on the Platte River near Denver, Oct. 16, 1885, and subsequently sent to Prof. Robt. Ridgway, who verified the

identification. Later (after the habitat of this subspecies was restricted to the Pacific Coast), the specimen was shown to Prof. W. W. Cooke, who probably thinking it would, at that time, be referred to *connectens*, made no mention of it in his 'Birds of Colorado'. This disposal of it did not satisfy the writer, however, who quite recently again sent it to the National Museum, at the same time calling attention to the restriction in habitat which had taken place since the original examination. In due time the specimen was returned still bearing the above cognomen.

Junco montanus. MONTANA JUNCO.—In a large series of Colorado Juncos, we find a number that are evidently referable to this species. A few of these were selected and sent to Prof. Robt. Ridgway for further examination, and specimens from the following localities were identified by him as this species. These are a pair taken by the writer on the Platte River near Denver, Dec. 3, 1885, and March 23, 1892, respectively. Two females taken on Clear Creek, near Denver, by Curator Ferril, April 2, 1901, and a male taken at Ralston Creek, Jefferson Co., by Ralph Smith, Feb. 22, 1895. We believe it is quite common at these localities, both as a migrant and winter resident.

Pipilo fuscus mesoleucus. CAÑON TOWHEE.—In a small collection of birds made by Howard S. Reed, the writer had the pleasure of examining a specimen of this subspecies, shot near Boulder, Colo., March 17, 1895. So far as I know this is the most northern record of the variety in Colorado; other recorded captures having come from the Arkansas Valley in Pueblo County. In this connection it might be well to mention the taking of several specimens by Curator Ferril at Las Animas, Bent Co., on April 27, 1907, which would seem to extend its range somewhat to the eastward. In 1906 the writer also took two males at Watervale, Las Animas Co., Aug. 7 and 8, respectively, and saw several others while there.

Guiraca caerulea lazula. WESTERN BLUE GROSBEEK.—Since recording this bird at Wray (Auk, Jan. 1905, p. 82), we have found it to be a not uncommon summer resident in eastern Yuma Co. The writer came upon a young brood not yet able to fly, near Boyes's ranch, Dry Willow Creek, June 5, 1905. The parents were feeding them at the time. The species was not uncommon, both here and in the vicinity of Wray. The dates of a number of specimens taken from 1904 to 1906, inclusive, vary from May 21 to June 15.

Cyanospiza cyanea. INDIGO BIRD.—A female was taken by Curator Will C. Ferril, at Hugo, Lincoln Co., Colo., June 9, 1906, and is now in the Historical Society's collection.

Spiza americana. DICKCISSEL.—Not uncommon summer resident at Wray, Yuma Co., where my attention was first called to them by Mr. W. E. Wolfe, who kindly drove me out to a certain field where they were apparently breeding.

One male was taken June 2, 1905, and two others on June 15, 1906. Their songs are not uncommon in the fields in the vicinity of town, where they doubtless nest; in fact, the writer marked several areas in which nests

were presumed to be located, but owing to stress of other matters, time was not taken to search carefully for them. The females were not often seen and were doubtless incubating. Also heard in the fields near Boyes's ranch some ten or twelve miles south of Wray.

Piranga erythromelas. SCARLET TANAGER.—An adult male was taken by Mr. W. C. Ferril at Palmer Lake, Colo., May 17, 1902, and was mounted by the writer. A second specimen, also an adult male, was taken at Pueblo, Colo., May 20, 1904, by Mr. B. G. Voight, who kindly donated it to the State Museum.

Vireo olivaceus. RED-EYED VIREO.—Two additional captures of this species may be given, the first a male, taken by Mr. L. C. Bragg at Boulder, Colo., May 30, 1904, and afterward kindly donated to the society. The second, also a male, was taken by Mr. W. C. Ferril at Wray, Yuma Co., May 26, 1906.

Lanivireo solitarius cassini. CASSIN VIREO.—This species was first definitely recorded for Colorado in the 'Nidologist,' Vol. III, p. 76, a female having been taken by myself at Aurora, near Denver, May 13, 1888. This, however, was not the first specimen taken by the writer, as a recent examination of the vireos in my collection, now the property of the State Historical Society, disclosed two others which, being fall specimens and in obscure plumage, were previously overlooked. The first, a male, was taken on the Platte River near Denver, Sept. 16, 1884; the other (sex?) Sept. 9, 1887, near Creswell, Jefferson Co., Colo. Both were recently identified by Mr. H. C. Oberholser.

Vireo bellii. BELL'S VIREO.—Since the records of specimens given in 'The Auk' (Jan., 1905, p. 82), taken near Wray, Yuma Co., in 1904, the writer has had further experience with this species, having again found it common, locally, around Wray in 1905 and 1906, specimens being taken as late as June 15 in the latter year. Also common on Dry Willow Creek, in the southeastern part of the county, where two males were taken June 9 and 11 respectively.

August 31, 1905, a family was seen at Julesburg, Sedgwick Co., one of which was taken. From May 22 to 25, 1907, they were quite common at Holly, Prowers Co., where the writer took a male on the 22d and a female the following day. The species was in full song and one of the most characteristic vocalists of the willow thickets.

Vireo vicinior. GRAY VIREO.—May 16 to 27, inclusive, 1907, the writer made collections in the Arkansas Valley between Manzanola, Otero Co., and Holly, near the State line in Prowers Co. May 16 to 20, inclusive, was spent at Lamar, at which place four specimens of this southern species were taken, which prove to be the first records for the State. The first male was taken May 16, one female on the 18th, and the other two, a pair, on the 20th. All were shot within a few yards of the same spot — used as a general dump ground — in a small grove on the Arkansas River north of town. Possibly the greater abundance of insects in this locality was the attraction for them. Special search at the other places visited, namely:

Holly, Prowers Co.; Prower, Bent Co.; La Junta and Manzanola, Otero Co.; but no other specimens were seen. Prof. W. W. Cooke writes me that, "The nearest previous record is in New Mexico, not far from Las Vegas." Specimens were examined by members of the Biological Survey.

Mniotilta varia. BLACK AND WHITE WARBLER.—One seen by the writer at Holly, Prowers Co., Colo., May 23, 1907. Observed for a few moments, but a few yards away, climbing about on the trunk of a cottonwood in the manner peculiar to the species, and under circumstances which preclude the possibility of misidentification.

Helminthophila peregrina. TENNESSEE WARBLER.—It was common during my stay at Holly, Prowers Co., from May 22 to 25 inclusive, 1907, at which time several were often seen together in company with other warblers. Two males were taken May 22 and 23 respectively. A day spent at Manzanola, Otero Co. (May 27), revealed several specimens, a male being taken. About the same time Mr. Ferril, while collecting at Julesburg, Sedgwick Co., took a male, May 21, and saw several others. Later, on the 27th, he took specimens at Kit Carson, Cheyenne Co., where it was not uncommon, being associated with Black-poll Warblers. From the above it would appear that the species was well represented during the spring migration of 1907, over the whole of eastern Colorado.

Compsothlypis americana ramalinæ. WESTERN PARULA WARBLER.—The writer took a female, May, 1904, on Clear Creek, near Denver, Colo., just over the line in Jefferson Co. Another specimen, also a female, was taken by W. C. Ferril from a flock of about a dozen, at Kit Carson, Cheyenne Co., Colo., May 27, 1907. Both were later examined by Mr. H. C. Oberholser of the Biological Survey.

Dendroica caerulescens. BLACK-THROATED BLUE WARBLER.—Sept. 18, 1903, saw a beautiful male, from the second floor of the hotel in Wray, Yuma Co. The bird was in a cottonwood tree opposite the window and about 10 feet from the writer.

Dendroica coronata. MYRTLE WARBLER.—One shot by the writer at Holly, Dec. 31, 1907. So far as we know this is the first winter record for Colorado. The bird was in the underbrush near the Arkansas River and entirely alone.

Dendroica maculosa. MAGNOLIA WARBLER.—A male taken at Holly, Prowers Co., May 22, 1907, is now in the Historical Society collection.

Thryomanes bewickii leucogaster. BAIRD'S WREN.—A female was taken by the writer May 23, 1907, at Holly, Prowers County. This is apparently the most eastern record for the State.

Polioptila caerula obscura. WESTERN GNATCATCHER.—Three males of this subspecies, which are apparently the first records for Colorado, were taken by Mr. W. C. Ferril at Grand Junction, Mesa Co., May 17, 1906. Mr. Ferril's attention was first called to them by hearing unfamiliar call notes, which upon investigation proved to come from this species, which he soon found was not uncommon in the shrubbery near the confluence of the Gunnison and Grand Rivers. Many specimens were seen during the

day, both singly or in small parties of three or four, associated with warblers and other species common in the locality. Specimens were examined by members of the Biological Survey.

Sialia sialis. BLUEBIRD.—The experience of Curator Ferril and the writer would indicate that the Bluebird is not uncommon in eastern Colorado, from the northern boundary of the State to as far south at least as the Arkansas River. It was observed by Mr. Ferril at Julesburg, Sedgwick Co., May 21, 1907; it also has been seen by Mr. W. E. Wolfe and the writer at Wray, Yuma Co., in May. Mr. Ferril took two males and saw one other at Kit Carson, Cheyenne Co., May 26, 1907. The writer found it breeding at Holly, Prowers Co., May 22, and took a pair at Prowers, Bent Co., May 25, 1907. The writer observed it at Denver years ago and there is a female in the collection taken by the Curator at Arvada, Jefferson Co., May 27, 1902.

A PRELIMINARY LIST OF THE BIRDS OF SHANNON AND CARTER COUNTIES, MISSOURI.

BY E. SEYMOUR WOODRUFF.

THE following list of birds is the result of daily observations by the writer, made for the most part in the early morning hours, during a three months' stay in the Ozark Mountains of Shannon and Carter Counties, Missouri, from March 7 to June 8, 1907.

This interesting section of southern Missouri has hitherto been almost completely neglected by ornithologists. It accordingly is deemed advisable to publish a list of the birds observed during this visit, notwithstanding its brevity and the limited opportunity available to me for field work, especially in view of the several interesting records made there. A few of the more interesting 'finds' were recorded by the writer in 'The Auk,' Vol. XXIV, pp. 348, 349, July, 1907, and reference to a number of others is made in Mr. Otto Widmann's excellent work on the birds of Missouri, which has recently appeared.¹

Because of my short stay and the consequently restricted area

¹ A Preliminary Catalog of the Birds of Missouri, by Otto Widmann. Trans. Acad. Sci. of St. Louis, Vol. XVII, No. 1, pp. 1-288. Issued Nov. 16, 1907.

covered, the list must necessarily be very incomplete, but in order to increase its value as a local list, I have added at the end as a supplementary list such species as have been noted in Shannon County by Mr. Walter Giles Savage, of Monteer, Missouri, but which were not seen there by me.

Shannon County is about fifty miles north of the Arkansas line and one hundred and ten miles west of the Mississippi River, and Carter County, which adjoins Shannon on the southeast, is thirty miles north of Arkansas and ninety miles west of the Mississippi (see Map); both counties lying on the southeastern slope of the Ozark Mountains of southern Missouri.

The Ozark region is hardly mountainous, as the name might imply, but is an isolated plateau with a maximum altitude of 1700 feet, lying between the Mississippi lowlands on the east and southeast, and the prairie region on the north and west.

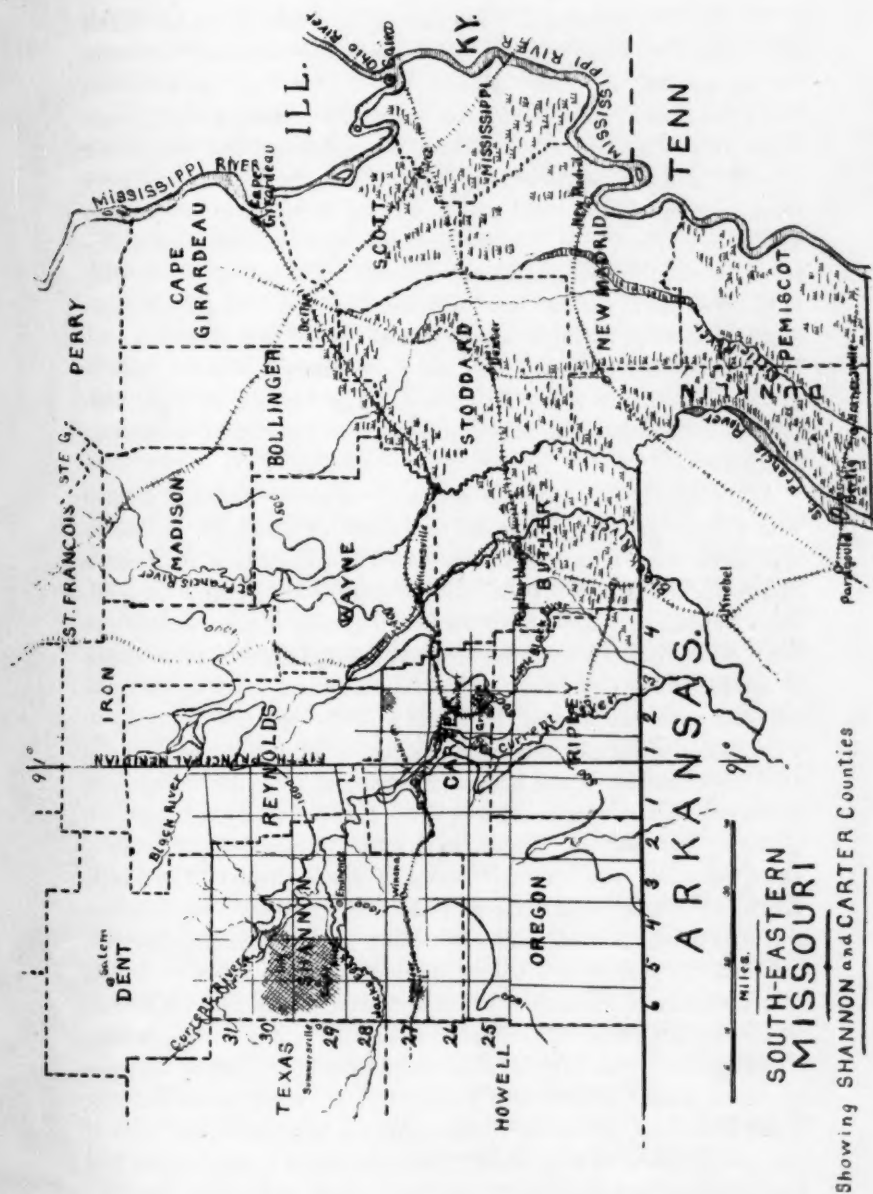
In Shannon County the surface of the plateau, here attaining a height of 1100 feet, has been deeply eroded through the action of streams. These have cut up the country into a maze of ravines, deep valleys and narrow gorges, with bluffs and cliffs of limestone often reaching a height of from 200 to 300 feet.

Two large streams, the Current River and Jack's Fork, cross this county and unite in the east-central part in Township 29, Range 3 West. The Current River enters the county in its north-western corner, flows in a general southeasterly direction, and passing into and through Carter County, finally empties into the Black River in Arkansas. Jack's Fork enters the county on the west and flows northeasterly till it meets and empties into the Current River.

In Carter County the hills, which here have an elevation of about 700 feet, are rolling and much less rugged than in Shannon County.

Originally both counties were covered with an unbroken forest of oaks and short-leaf pine (*Pinus echinata*), but the latter has now been almost wholly lumbered out except in certain portions of Shannon County.

As the work done in Shannon County was for the most part confined to Townships 29 and 30, Range 5 and 6 West (see Map), covering an area of about ninety square miles, a more detailed description of that section may be of interest. The country is extremely rough, with an intricate network of ravines, or "hollows,"



as they are locally termed. The ravines and valleys contain water only after very heavy rains, a condition which occurred but twice during my stay, on March 13 and May 5. On these two occasions there had been a heavy down-pour during the preceding night, seemingly with little or no effect at first, but suddenly there was a roar of water and the previously dry bed of Spring Valley, by which we were encamped, was filled with a rushing torrent 4 to 10 feet deep and 30 to 100 feet wide. In about three days the water had disappeared except for occasional small pools. The explanation of this is to be found in the fact that the ground, which is largely of limestone formation, is honey-combed with caves and sinkholes, the latter sometimes a hundred feet deep. Springs appear only to disappear as suddenly a few feet below. The water is of a greenish blue color on account of the great amount of lime which it contains in solution.

At the time of my visit, this section of the county was still clothed with a virgin growth of pine and oak forest, of which the characteristic birds were Turkeys, Red-cockaded Woodpeckers, Bachman's Sparrows, and Pine Warblers. Unfortunately this forest is doomed, for a lumber company was even then building a railroad into the heart of the timber with a view to commencing lumbering operations at once. Forests of pure pine (*Pinus echinata*) and mixed pine and oak cover the tops of the ridges and the plateau, changing to pure stands of various species of oak on the steeper slopes. In the valley bottoms are found a greater variety of trees, including such species as walnut, sycamore, elm, silver maple, box elder, basswood, buckeye, redbud, and others, and small thickets of witchhazel, alder, sassafras and various species of small shrubs. Cardinals, Kentucky Warblers, and Green-crested Flycatchers were the conspicuous birds of these bottoms. The forest is remarkably free from all undergrowth, which is undoubtedly due to the long-continued custom of the settlers of burning over the ground each year, under the erroneous idea that they thereby improve the grazing. Clearings are few and far between and mostly in the narrow bottoms of Black, Casto, and Spring Valleys. The largest is at Eudy, a small settlement on the top of the plateau a mile and a half west of our camp, where an area about three-quarters of a mile square had been cleared and cultivated. Another small settlement, Ink, lay

five miles northeast of camp, and ten miles to the southeast was a smaller one, Alley, situated on the banks of Jack's Fork and on the road to Winona, some twenty-five miles to the southeast.

The settlers raise cattle and hogs, and enough corn to feed their stock during the winter. The latter roam the woods at will, for the only fences in this region are those enclosing the cornfields.

My stay in Shannon County lasted from March 10 to May 15, 1907, inclusive. The spring migration, so far as purely transient species were concerned, had scarcely gotten under way before my arrival, and most if not all the species observed the first few days had probably wintered in the region. The weather was very warm during the last three weeks of March, reaching an average maximum temperature of over 82° F. daily from March 17 to 29 inclusive, and causing the leaves and flowers of many trees and plants to burst their buds. The night of the 18th brought a large flight of birds, mostly of the sparrow family. It grew steadily colder from March 29th till April 19, often freezing at night after April 8, with the result that much of the newly grown foliage was killed. The days were raw, windy and rainy, and, except for two small flights on the nights of April 3 and 13, there was no noticeable movement of birds. On the 19th there came a welcome change in the weather and from then till April 29 it was warm and clear. With the change came the birds, of which there were large flights on April 20 and 21, 24 and 25, culminating on April 28 and 29 in the largest flight of the season. From then till May 8 it was rainy and colder and the migration halted. On May 8 and 9 and again on the 13th large flights occurred, and the transients were still present in large numbers when I left on May 15 for Grandin, Carter County.

April 19, 20 and 21 were spent at Current River near Round Spring (Twp. 30. R. 4 W), about twelve miles northeast of our camp. I found the valley fairly alive with birds and noted several species which did not appear in the region about camp till three or four days later. This valley is probably the main migration route for the county and is occupied by new migrants several days before the same species will be found in the surrounding region.

At Grandin, Carter County, the country differed somewhat in character from that about our camp in Shannon County. The valleys are broader and the hills much less rugged. Practically

all the pine has been cut and much of the oak also, so that considerable young second-growth woods is to be found. It is more thickly settled and consequently there is a greater proportion of cleared and cultivated land. In the river valleys are dense wooded thickets, containing a great variety of trees, bushes, and shrubs.

Grandin is a lumbering village situated in the valley of the Little Black River near the southern border of the county. I had stopped there for two days (March 7 to 9) on my way to camp, and returned May 16 to remain till June 8. The migration was still in full swing on May 16 and 17, but by the 20th it was practically over for the season. Many transients, however, remained till near the end of the month, for the extraordinarily late spring had greatly delayed the arrival and departure of all species.

Because of the late spring, most of the dates of arrival and departure given are probably several, and, in some cases, many days behind the normal dates of arrival and departure in that section. The migration during March was probably nearer normal, for the cold weather did not come on till April.

As Missouri lies on the dividing line between many of the eastern and western forms, it was not surprising that representatives of both forms of certain species and intermediates between them should have been found, and I am very much indebted to Dr. J. A. Allen, Dr. Jonathan Dwight, Jr., and to Mr. H. C. Oberholser for their valuable assistance in determining the subspecific rank of a number of the birds secured there. I am also much indebted to Mr. Walter Giles Savage of Monteer, Shannon Co., Mo., for supplying notes of the occurrence in Shannon County of such species of birds as have come under his observation during the past four years of his residence there, but which, owing to my brief visit and for other obvious reasons, seasonal and otherwise, were not observed by me.

Of the birds here listed, the following were the first to be recorded from Missouri: Red-cockaded Woodpecker,¹ White-winged Crossbill,² Western Savanna Sparrow³, Western Field Sparrow,⁴ Montana Junco,⁵ Brewster's Warbler,⁶ and Alder Flycatcher.⁷ Other records of especial interest were the finding of Bachman's Warbler⁸

¹ Auk, Vol. XXIV, p. 349.

² *Ibid.*

³ Widmann, Prelim. Cat. Birds Mo., p. 176.

⁴ *Ibid.*, p. 187.

⁵ *Ibid.*, p. 189.

⁶ Auk, Vol. XXIV, p. 348.

⁷ *Ibid.*, p. 349.

⁸ *Ibid.*, p. 348.

and Brown-headed Nuthatch,¹ and the occurrence of Bachman's Sparrow² and Pine Warbler³ as common summer residents in the pine woods of Shannon County.

A total of 189 species and subspecies are recorded in the following lists, including the supplementary list, of which 187 are to be credited to Shannon County; the only two not yet recorded from Shannon County being the Yellow-bellied Flycatcher (*Empidonax flaviventris*) and the Alder Flycatcher (*E. trailli alnorum*), which were secured at Grandin, Carter County. One hundred and three species were noted in Carter County during the three weeks of my stay there (March 7 and 8, and May 16 to June 8 inclusive).

Species whose occurrence was confirmed by the securing of specimens are designated by an asterisk (*) preceding their names. All records between the dates of March 10 and May 15, inclusive, apply to Shannon County only. Records on March 7 and 8 and from May 16 to June 8, inclusive, apply to Carter County only. Where no locality is given, it is to be understood that the bird in question was found in both counties. Such species as were found by me in one county only are so noted.

(*Anatidae*.—On the evening of March 10, the night of my arrival in Shannon County, a steady stream of ducks was to be heard passing over us to the north till after midnight. This was the only night during which any were heard.)

*1. *Querquedula discors*. BLUE-WINGED TEAL.—Several were seen and one male secured on the Current River, April 18, 1907. Shannon Co.

2. *Marila affinis* (sp.?). LESSER SCAUP DUCK (?).—On April 20 two flocks of Scaup Ducks, about thirty in all and probably this species, were seen on the Current River, Shannon Co.

*3. *Botaurus lentiginosus*. AMERICAN BITTERN.⁴—On April 8, a very raw and windy day, I was surprised to see a bittern in the heart of the pine and oak woods and beside a shallow pool of rain water in a slight depression on the top of the plateau. His presence in such an unusual situation can probably be accounted for by the fact that the two preceding days and nights had been very windy with heavy showers. He appeared to be weak and unwilling to fly, merely flopping across the pool when I approached too near. On my return two or three hours later he had not moved. His stomach was empty. Shannon Co.

¹ Auk, Vol. XXIV, p. 349.

² *Ibid.*, p. 349.

³ *Ibid.*, p. 348.

⁴ Widmann, Prelim. Cat. Birds Mo., p. 52.

4. *Ardea herodias*. GREAT BLUE HERON.—On April 15 one was seen beside a pool in the otherwise dry river bed of Spring Valley, and another on April 20 flying over the Current River, Shannon Co.

5. *Butorides virescens*. GREEN HERON.—One was flushed from a tree over a pool of water filling one of the numerous sinkholes which are to be found all through the woods on top of the plateau. Shannon Co.

*6. *Nycticorax nycticorax naevius*. BLACK-CROWNED NIGHT HERON.—A specimen was secured in Spring Valley, April 23. The only one seen. Shannon Co.

*7. *Actodromas fuscicollis*. WHITE-RUMPED SANDPIPER.¹—One was secured from a flock of about twelve on a mudflat in Jack's Fork of Current River, May 15. Shannon Co.

*8. *Helodromas solitarius*. SOLITARY SANDPIPER.—One was seen May 1 beside a small pool of rain-water in the heart of the woods, and another secured May 13 beside a small pool in the meadows at Eudy. Single individuals were seen on the Current River April 20 and 21. Shannon Co.

9. *Actitis macularia*. SPOTTED SANDPIPER.—A single specimen was seen April 21 on Current River, Shannon Co.

*10. *Colinus virginianus*. BOBWHITE.—These birds were very common and were found not only in the valley bottoms in or near clearings, but also in the heart of the woods at some distance from any of the few and small clearings.

11. *Bonasa umbellus*. RUFFED GROUSE.—One was heard drumming on the bluffs above Current River, Shannon Co., April 19, 20 and 21, but with this exception none was seen or heard throughout my stay in Shannon or Carter Counties. This was not surprising, owing to the lack of suitable brush cover. The annual burning over of the floor of the forests is given by Mr. Widmann² as one of the theories to account for the disappearance of the Ruffed Grouse from the Ozarks, where they were formerly numerous. He says: "As this custom has been followed for fifty years, it has succeeded in extirpating a large number of plants, some of which may formerly have been helpful or needed in making the region a desirable abode for the Ruffed Grouse."

*12. *Meleagris gallopavo silvestris*. WILD TURKEY.—The Wild Turkey is still a comparatively common though extremely shy bird in Shannon County. On March 18 a flock of seven was seen, but as a rule they were single or in pairs. The cocks began "gobbling" the latter part of March, and as many as four gobblers were heard at the same time. On April 16 I secured a hen turkey in whose oviduct was found a fully developed egg, shell and all. In her crop was a small lizard. On May 13 one of our party flushed a turkey from a nest containing ten eggs, and on returning three or four days later the eggs were found to be cold and evidently deserted.

¹ Widmann, Prelim. Cat. Birds Mo., p. 68.

² *Ibid.*, p. 81.

*13. *Zenaidura carolinensis*. MOURNING DOVE.—Common about the cultivated fields at Eudy, Shannon Co. First seen March 17. Common at Grandin, Carter County.

14. *Cathartes aura septentrionalis*. TURKEY VULTURE.—Fairly common. Two eggs nearly ready to hatch were found May 13 in a small cave, four feet deep, in Shannon Co.

15. *Catharista urubu*. BLACK VULTURE.¹—Not common. Though I was confident that I saw this species a number of times, it was only once positively identified—April 29, Shannon Co.

*16. *Accipiter velox*. SHARP-SHINNED HAWK.—Not common. Seen only four times (March 23, 30; April 21 and May 2). On May 2 I secured a female containing three nearly developed eggs in her ovaries, so they must breed here.² Shannon Co.

17. *Buteo borealis*. RED-TAILED HAWK.—Fairly common.

*18. *Buteo borealis krideri*. KRIDER'S HAWK.—On April 10 I secured an immature male which has since been identified by Mr. H. C. Oberholser as referable to this subspecies. Shannon Co.

19. *Buteo platypterus*. BROAD-WINGED HAWK.—Not common. A nest with three downy young a day or two old was found May 25 in an oak in the valley of the Little Black River near Grandin, Carter Co.

20. *Cerchneis sparveria*. AMERICAN SPARROW HAWK.—Fairly common.

21. *Pandion haliaëtus carolinensis*. AMERICAN OSPREY.—One seen over Current River, Shannon Co., April 21.

22. *Syrnium varium*. BARRED OWL.—A large owl, probably this species, was hooting about our camp in Shannon Co., on the night of April 21. (Mr. Savage informs me that he has heard this owl occasionally in this county.)

23. *Coccyzus americanus*. YELLOW-BILLED CUCKOO.—Fairly common. Two nests containing one egg each were found May 17 and 21 at Grandin.

24. *Coccyzus erythrophthalmus*. BLACK-BILLED CUCKOO.—Rare. None seen in Shannon Co. The only specimen positively identified was in Carter Co., May 23. (See supplementary list.)

25. *Ceryle alcyon*. KINGFISHER.—Fairly common.

*26. *Dryobates villosus*. HAIRY WOODPECKER.—Common in Shannon Co. None were seen at Grandin, Carter Co. The ovaries of a female secured March 27 contained two well developed ovules, so nesting had probably begun.

(One of the most noticeable things about the bird life in Shannon Co., was the great abundance of Woodpeckers of all kinds—eight species in all. This was especially marked during March before nesting had begun.)

*27. *Dryobates pubescens medianus*. DOWNY WOODPECKER.—Very common.

¹ Widmann, Prelim. Cat. Birds Mo., p. 88.

² *Ibid.*, p. 92.

*28. *Dryobates borealis*. RED-CKOADED WOODPECKER.— I was fortunate enough to be the first to introduce this bird ¹ to the list of the birds of Missouri.² At first they seemed to be rare, for up to April 10 I had only found them twice — three together on March 15 and two on March 30. But from April 10 on till the end of my stay in Shannon Co. (May 15) I saw them constantly. The female of a pair secured April 19 (on which day I saw four pairs) was in breeding condition, and a male secured on May 12 showed by the thin and featherless condition of the skin on his breast and belly that he was sharing with his mate in the duties of incubation.

I met them again in the virgin pine woods near the northern border of Carter Co. (Twp. 27, R. 2 East) on May 29, but about Grandin, fourteen miles to the south, where all the pine had been cut, none were found. As they seemed to confine themselves to the pine woods, I believe they will be driven out of this region as fast as these woods are cut off.

*29. *Sphyrapicus varius*. YELLOW-BELLIED SAPSUCKER.— One was seen at Grandin March 8. They were abundant in Shannon Co. from March 21 to April 8, after which only a few were seen daily till April 25, and the last on May 9. This last record is considered suspiciously late by Mr. Widmann,³ and is possibly that of a breeding bird.

The sapsuckers were very partial to the sap (?) of witch-hazel, which grew abundantly in the bottoms of the larger ravines, and numbers of them were to be seen making rows of punctures on the stems of this shrub from six inches to two feet from the ground.

*30. *Phloeotomus pileatus abieticola*. NORTHERN PILEATED WOODPECKER.— The two specimens secured on April 13 and May 13, both males, were identified by Mr. H. C. Oberholser as belonging to this subspecies, though the southern form might be expected to occur there.

This woodpecker was fairly common in Shannon Co., but very shy and difficult to approach within gun range. The male secured May 13 proved by the condition of the skin on his breast and belly that he also was sharing with his mate in the duties of incubation.

None was seen at Grandin, but it doubtless occurs in the heavier woods.

*31. *Melanerpes erythrocephalus*. RED-HEADED WOODPECKER.— An abundant summer resident, and probably a rare winter resident. One specimen was seen March 10 and a pair March 30. These had probably wintered, for no more were seen in the region about our camp in Shannon Co. till April 26, on which date they were found in large numbers. But on April 20 I found them to be common in the valley of the Current River, some ten miles to the northeast of camp. These birds were probably the vanguard of the migrants which were pushing up the valley and which did not penetrate back into the forest until six days later. Common at Grandin.

¹ Auk, Vol. XXIV, p. 349.

² Widmann, Prelim. Cat. Birds Mo., p. 121.

³ *Ibid.*, p. 123.

*32. *Centurus carolinus*. RED-BELLIED WOODPECKER.— A fairly common resident.

*33. *Colaptes auratus luteus*. NORTHERN FLICKER.— Common. They were very abundant in Shannon Co. from March 19 to 24, when the main body of transients passed through.

34. *Caprimulgus carolinensis*. CHUCK-WILLS-WIDOW.— None were positively identified in Shannon Co., though on May 12 I flushed a bird which from its large size I suspected to be this species. (See supplementary list.) At Grandin, Carter Co., they were evidently fairly common, for on the nights of May 21, 22 and 23 several could be heard at the same time. It was easy to distinguish them from the Whip-poor-will, for both species could be heard at one time; the one in the valley bottom and the other in the slopes above.

*35. *Caprimulgus vociferus*. WHIP-POOR-WILL.— Common. The first specimen was seen and secured April 6.

36. *Chordeiles virginianus*. NIGHTHAWK.— Not very common. First one seen May 8.

37. *Chaetura pelagica*. CHIMNEY SWIFT.— Because of the extensive woods and of the fact that chimneys were few and far between in the vicinity of our camp in Shannon Co., swifts were rarely seen. The first one noticed was on May 10.

In Carter Co. they were common.

*38. *Trochilus colubris*. RUBY-THROATED HUMMINGBIRD.— The first hummingbird appeared April 28, and they became common on and after May 4.

39. *Tyrannus tyrannus*. KINGBIRD.— Lack of suitable country doubtless accounts for the rarity of the Kingbird in this section of Shannon Co. They were met with only twice — April 28 and May 4 — and on both occasions were in the meadows at Eudy.

At Grandin they were fairly common.

40. *Myiarchus crinitus*. CRESTED FLYCATCHER.— Common. Arrived in Shannon Co. April 29.

41. *Sayornis phoebe*. PHOEBE.— Common. The Phoebe was already present on my arrival at Grandin on March 8, and in Shannon Co., March 10. On March 16 I saw a Phoebe building a nearly completed nest under an overhanging limestone cliff. Several nests were found in like situations in the latter part of March.

42. *Myiochanes virens*. WOOD PEWEE. Common, arriving in Shannon Co., April 29.

*43. *Empidonax flaviventris*. YELLOW-BELLIED FLYCATCHER.¹— The only specimen seen was one which I secured at Grandin, Carter Co., May 16.

*44. *Empidonax virescens*. GREEN-CRESTED FLYCATCHER.— Common. First seen in Shannon Co. April 29 and became common after May 8.

*45. *Empidonax traillii alnorum*. ALDER FLYCATCHER.^{2, 3} — On June

¹ Widmann, Prelim. Cat. Birds Mo., p. 140.

² Auk, Vol. XXIV, p. 349.

³ Widmann, Prelim. Cat. Birds Mo., p. 142.

3, I saw a pair of these birds on the edge of a small apple orchard in a meadow in the valley of the Little Black River at Grandin, Carter Co. The female was secured (No. 1583, ♀, Coll. of L. B. and E. S. W.) and was identified as belonging to this subspecies by Dr. J. A. Allen, Dr. J. Dwight, Jr., and Mr. H. C. Oberholser. This is the first Alder Flycatcher to be recorded from Missouri.

(In recording this bird in 'The Auk,' Vol. XXIV, p. 349, I inadvertently used the name 'Traills' Flycatcher, though designating it under its proper subspecific name.)

*46. *Empidonax minimus*. LEAST FLYCATCHER.—Not common. First seen May 8, and last seen May 17. Shannon Co.

*47. *Otocoris alpestris praticola*. PRAIRIE HORNED LARK.—Several pairs were breeding in the meadows about Eudy, Shannon Co. The condition of the breast and belly of a female secured March 23 proved that breeding had already begun at that time.

*48. *Cyanocitta cristata*. BLUE JAY.—Common. They were abundant in Shannon Co. from April 28 to May 4 inclusive, flying about in large flocks.

49. *Corvus brachyrhynchos*. AMERICAN CROW.—Not common.

50. *Dolichonyx oryzivorus*. BOBOLINK.—Rare, but this was to be expected considering the scarcity of open fields. Two were seen May 4 in the meadows at Eudy, Shannon Co., and several at Grandin, Carter Co., May 16 and 21.

*51. *Molothrus ater*. COWBIRD.—Common. First seen in Shannon Co., March 19. In Carter Co. I found a nest of the Bachman Sparrow on May 27, which contained, besides two of its own eggs, three of the Cowbird, all evidently laid by the same bird.

52. *Agelaius phoeniceus*. RED-WINGED BLACKBIRD.—I saw this bird in the valley of Jack's Fork on my way to and from camp, March 10 and May 15, and they were probably common in the valleys of this and the Current River.

At Grandin they were common in wet meadows.

*53. *Sturnella magna*. MEADOWLARK.—Fairly common in clearings.

*54. *Icterus spurius*. ORCHARD ORIOLE.—Common about clearings. First seen May 9.

55. *Icterus galbula*. BALTIMORE ORIOLE.—Rare. Only one specimen seen in Shannon Co., May 4. None seen at Grandin.

56. *Euphagus carolinus*. RUSTY BLACKBIRD.—A large flock was seen March 19. Shannon County.

57. *Quiscalus quiscula seneus*. BRONZED GRACKLE.—Fairly common near clearings in Shannon Co. None seen at Grandin.

*58. *Carpodacus purpureus*. PURPLE FINCH.—The Purple Finch was already present on my arrival at Grandin March 8, and in Shannon Co. March 10, and were to be seen in large flocks till April 25, on which day the last bird was noted.

*59. *Loxia curvirostra minor*. AMERICAN CROSSBILL.¹—Small flocks

¹ Widmann, Prelim. Cat. Birds Mo., p. 168.

were seen in Shannon Co. every few days from April 3 to May 1 inclusive.

*60. *Loxia leucoptera*. WHITE-WINGED CROSSBILL.^{1, 2} — On April 18 I secured a female White-winged Crossbill that was feeding on the ground in company with two American Crossbills, both females. This is the first one to be recorded from Missouri, and, as a record, is all the more surprising because of having been taken so near the southern border, while it has not yet been recorded from the northern part of the State.

61. *Astragalinus tristis*. AMERICAN GOLDFINCH. — Goldfinches were fairly common, though varying exceedingly in numbers, throughout my stay in the Ozarks.

*62. *Spinus pinus*. PINE SISKIN.³ — The first siskins were seen in Shannon Co. on April 28, 29 and 30. Another flock was seen May 13. At Grandin, Carter Co., I found small flocks on May 16, 17 and 21, and on June 4, when in the pine woods near the northern border of the county, a siskin flew by me so close that I could not have been mistaken in my identification.

63. *Passer domesticus*. ENGLISH SPARROW. — Even in the heart of the pine and oak woods, wherever there was a clearing with an occupied log cabin, this omnipresent bird was to be found.

*64. *Poocetes gramineus*. VESPER SPARROW.⁴ — A common transient in meadows in the valley bottoms and about Eudy, Shannon Co. The first were seen March 19 and last on April 7.

*65. *Passerculus sandwichensis savanna*. SAVANNA SPARROW.⁵ — Two were found April 25, and on April 28, May 4 and May 13, I found them common on the meadows about Eudy, Shannon Co. A Savanna Sparrow taken March 22 (the date given by Mr. Widmann,⁶ March 19, is an error), proved to belong to the following subspecies.

*66. *Passerculus sandwichensis alaudinus*. WESTERN SAVANNA SPARROW.⁶ — On March 22 I found a flock of sparrows in a narrow meadow in Spring Valley containing three or four Savanna Sparrows and a number of Vesper Sparrows. One of the former was secured and was identified by Mr. H. C. Oberholser as belonging to this subspecies (No. 1400, ♂, Coll. of L. B. and E. S. W.).

This specimen is the first recorded from Missouri.

*67. *Coturniculus savannarum passerinus*. GRASSHOPPER SPARROW.⁷ — Several were seen and one secured in a narrow meadow in Black Valley, Shannon Co., on March 19. This appears to be the earliest date on record for Missouri. Mr. Widmann states⁸ that the first arrive in southern

¹ Widmann, Prelim. Cat. Birds Mo., p. 169.

² Auk, Vol. XXIV, p. 349. *

³ Widmann, Prelim. Cat. Birds Mo., p. 171.

⁴ *Ibid.*, p. 175.

⁵ *Ibid.*, p. 176.

⁶ *Ibid.*, p. 176.

⁷ *Ibid.*, p. 177.

⁸ *Ibid.*, p. 177.

Missouri about the middle of April. The day and night preceding (March 18) had been exceptionally warm, and on the morning of the 19th I found the woods and valleys full of birds. The Fringillidae were most in evidence and among them several new arrivals (Grasshopper, Henslow, Vesper, Bachman's, and Swamp Sparrows). No more Grasshopper Sparrows were seen till April 14 and 17, on each of which days I saw and secured one specimen. On the 25th of April I found them common in the meadows at Eudy, and they were still to be found there May 13. I also found them at Grandin, Carter Co. (June 3), and believe they breed there.

After comparing the four specimens secured in Missouri with others secured in Connecticut I came to the conclusion that they were "rather intermediates, but nearer *bimaculatus*," and they were thus recorded by Mr. Widmann,¹ but Mr. H. C. Oberholser has since examined and identified these specimens as the eastern form (*C. s. passerinus*).

*68. **Ammodramus henslowi.** HENSLow SPARROW.—One was secured March 19 (the earliest date on record for Missouri)² from a flock of several Grasshopper, Vesper and Field Sparrows on the edge of a corn field in Black Valley, Shannon Co. Another was seen May 4 in the Eudy meadows.

*69. **Chondestes grammacus.** LARK SPARROW.—Evidently an uncommon bird in this region. One was seen and secured in a freshly plowed field at Eudy, Shannon Co., on May 13, and I found it again at Grandin, Carter Co., on May 16 and 17, one each day.

*70. **Zonotrichia leucophrys.** WHITE-CROWNED SPARROW.—Only met with twice, May 11 and 13; Shannon Co.

*71. **Zonotrichia albicollis.** WHITE-THROATED SPARROW.—Present on my arrival in Shannon Co., March 10, and common throughout my stay there. At Grandin, Carter Co., the last were seen May 17.

*72. **Spizella socialis.** CHIPPING SPARROW.—Common. First seen March 12, became common March 19, and abundant from April 9 to 20 when they were to be found everywhere—in the depths of the pine woods on top of the plateau, and in the open stretches in the valley bottoms.

*73. **Spizella pusilla.** FIELD SPARROW.—Already present on my arrival in Shannon Co., March 10, on which date I saw one. They became common on March 19. A nest and four eggs were found May 21 at Grandin, Carter Co.

*74. **Spizella pusilla arenacea.** WESTERN FIELD SPARROW.—Two of the four specimens of Field Sparrows taken in Shannon Co. proved to be of this form. These two specimens were secured March 13 and 19 (No. 1372 and 1392, Coll. of L. B. and E. S. W.), and are the first to be recorded from Missouri.³ Mr. H. C. Oberholser has confirmed my identification.

¹ Widmann, Prelim. Cat. Birds Mo., p. 178.

² *Ibid.*, p. 178.

³ *Ibid.*, p. 187.

On March 19, several *S. p. arenacea* were seen in a flock of *S. p. pusilla*, and I found it easy to distinguish them by the conspicuous gray crown-stripe of the former.

*75. **Junco hyemalis.** SLATE-COLORED JUNCO.—Juncos were present in large numbers on my arrival in Carter Co., March 7, and in Shannon Co. March 10. They were less abundant after April 7, and the last were seen April 27, except for a lone male secured May 21 at Grandin, Carter Co.¹ On examining this latter bird I found that its belly was distended to twice its normal size and was packed solid with a mass of transparent worms, three inches or more long and as thick as a small match, filling up every bit of space in the intestinal cavity. Though able to fly and otherwise in good condition, this load was evidently too much to carry and was the probable explanation of this exceptionally late date.

Dr. Jonathan Dwight, Jr., who is making an exhaustive study of the various races of Juncos of North America, kindly examined the series of thirteen Juncos secured, and divided them into the three races: *hyemalis hyemalis*, *hyemalis connectens*, and *hyemalis montanus*.

Specimens of *J. h. hyemalis*, taken from one flock March 11 in Shannon County, were very dark birds and typical of *J. h. hyemalis* from Alaska. Others taken later in the month and in April were similar to eastern representatives of the race.

*76. **Junco hyemalis connectens.** SCHUFELDT'S JUNCO.—A male Junco collected at Hunter, Carter Co., March 7, and a female collected in Shannon Co. March 17, were assigned by Dr. Dwight to this form.

*77. **Junco montanus.** MONTANA JUNCO.²—A female (No. 1364, ♀, Coll. L. B. and E. S. W.), secured March 11 from a large flock of Juncos in Shannon Co. was identified by both Dr. Dwight and Mr. H. C. Oberholser as of this species.

This is the first Montana Junco to be recorded from Missouri.

*78. **Peucea aestivalis bachmanii.** BACHMAN'S SPARROW.^{3,4}—On March 19 I saw and secured the first Bachman's Sparrow, and on and after April 6 found it common throughout the mixed pine and oak woods of Shannon Co. They seemed to prefer stands of mixed pine and oak to either pure pine or pure oak.

In Carter Co. I found it only four times (May 17, 24, 27 and June 4), but the fact that almost all the pine had been cut may explain their rarity here. On May 27, in the virgin pine and oak forest near the northern border of the county (Twp. 27, R. 2 East), I flushed a Bachman's Sparrow from a nest containing two of her own eggs and three of the Cowbird—incubation far advanced.^{5,6} This find was the first conclusive proof of

¹ Widmann, Prelim. Cat. Birds Mo., p. 188.

² *Ibid.*, p. 189.

³ *Ibid.*, p. 189.

⁴ Auk, Vol. XXIV, p. 349.

⁵ Widmann, Prelim. Cat. Birds Mo., p. 189.

⁶ Auk, Vol. XXIV, p. 349.

its breeding in the State. The nest was on the ground in a small clump of long grass and New Jersey tea (*Ceanothus americanus*), and close to the fallen top of a recently cut pine. These birds were found almost invariably near or in the tops of dead and down trees.

*79. *Melospiza cinerea melodia*. SONG SPARROW.—The Song Sparrow was a rare bird in Shannon Co., and not seen at all in Carter Co. I noted it only six times (March 10, 13, 17, 19, 30, and April 14). On March 19, the day sparrows of all kinds were so abundant, it was fairly common, but on the other dates only from one to three or four were noted.

*80. *Melospiza lincolni*. LINCOLN'S SPARROW.—These birds were probably fairly common though not many were seen. They confined themselves to the dense patches of low shrubs in the valley bottoms where it was difficult to see them and from which it was almost impossible to flush them. I met with it first April 14 in Shannon Co., and the last one was seen May 20 in Carter Co.

*81. *Melospiza georgiana*. SWAMP SPARROW.¹—Not common. First seen March 19; last seen May 13; Shannon Co.

82. *Passerella iliaca*. FOX SPARROW.—Fox Sparrows were very abundant at Hunter, Carter Co., March 7. The oak woods by the railroad station was alive with them. In Shannon Co. they were common until March 24 when they left except for one lone specimen seen April 6.

*83. *Pipilo erythrophthalmus*. TOWHEE.—Already present on my arrival at Grandin March 8, and Shannon Co. March 10, and was fairly common throughout my stay.

*84. *Cardinalis cardinalis*. CARDINAL.—Very common. Nests with eggs found from April 29 to May 25 inclusive, and a nearly full grown young bird was seen May 5.

85. *Zamelodia ludoviciana*. ROSE-BREADED GROSBEEK.—Rare. A male was seen May 2 and a female May 8, Shannon Co. At Grandin, I saw on May 20 what I was confident was a female Rose-breast high up in a tree, but as they rarely breed so far south, this record cannot be accepted as positive.

*86. *Passerina cyanea*. INDIGO BUNTING.—First seen April 28 and became common May 8, remaining so throughout my stay.

*87. *Spiza americana*. DICKCISSEL.—None were seen in the vicinity of our camp, but several were found May 15 in a cultivated meadow near Winona, Shannon Co. At Grandin they were common in meadows in the valley of the Little Black River. A nest with 5 fresh eggs was found June 3.

*88. *Piranga erythromelas*. SCARLET TANAGER.—Arrived in large numbers April 25 and was fairly common thereafter.

*89. *Piranga rubra*. SUMMER TANAGER.—First seen April 26 and became common on April 29. A nest with four eggs was found in Carter Co. June 4.

¹ Widmann, Prelim. Cat. Birds Mo., 192.

*90. *Progne subis*. PURPLE MARTIN.—First seen March 18. There was a small colony at Eudy, Shannon Co. At Grandin they were common, breeding in bird houses erected for their use.

91. *Hirundo erythrogaster*. BARN SWALLOW.—A flock of 12 Barn Swallows flew over me in Shannon Co., May 7, and several were seen flying over Jack's Fork May 15. None was seen in Carter Co.

92. *Iridoprocne bicolor*. TREE SWALLOW.—Rare. On May 4 I saw a lone Tree Swallow flying about a small pool of water in the meadows at Eudy, Shannon Co., and on May 15 several over Jack's Fork.

*93. *Stelgidopteryx serripennis*. ROUGH-WINGED SWALLOW.—Rough-winged Swallows were common along the Current River, in Shannon Co., April 20 and 21, over Jack's Fork May 15 and along the Current River in Carter Co. May 17.

94. *Bombycilla cedrorum*. CEDAR WAXWING.—None was seen in Shannon Co. At Grandin small flocks were seen May 20 and 24.

*95. *Lanius ludovicianus migrans*. MIGRANT SHRIKE.—The only Migrant Shrikes met with were two specimens that I secured March 18 in clearings in Black Valley, Shannon Co.

96. *Vireosylva olivaceus*. RED-EYED VIREO.—Common. First seen April 29.

*97. *Vireosylva philadelphicus*. PHILADELPHIA VIREO.¹—The first and only Philadelphia Vireo seen in Shannon Co., was one secured May 9.

At Grandin, Carter Co., I took two on May 17 and saw two more May 24, securing one.

*98. *Lanivireo flavifrons*. YELLOW-THROATED VIREO.—First one was seen April 14. They were common from April 25 to 30 inclusive, but from then until I left Shannon Co. (May 15) it was only occasionally met with. None seen in Carter Co.

99. *Lanivireo solitarius*. BLUE-HEADED VIREO.—Only one specimen was seen May 9; Shannon Co.

*100. *Vireo noveboracensis*. WHITE-EYED VIREO.—Arrived April 28 in Shannon Co., and were common thereafter. A nest with 4 fresh eggs and one of a Cowbird was found May 25 at Grandin, Carter Co.

101. *Mniotilta varia*. BLACK AND WHITE WARBLER.—This was the first of the warblers to appear in Shannon Co., arriving March 23.

It was fairly common throughout my stay in both counties.

*102. *Helminthus vermivorus*. WORM-EATING WARBLER.²—A common bird in Shannon Co., arriving April 25. At Grandin, only one was seen—May 30.

*103. *Helminthophila bachmani*. BACHMAN'S WARBLER.^{3, 4}—I was fortunate enough to meet with this interesting bird on two different occa-

¹ Widmann, Prelim. Cat. Birds Mo., p. 209.

² *Ibid.*, p. 215.

³ *Ibid.*, p. 215.

⁴ Auk, Vol. XXIV, p. 348.

sions, securing a male in Shannon Co. May 2, and another male at Grandin, Carter Co., May 23 (Nos. 1499 and 1575, Coll. L. B. and E. S. W.) There can be but little question that both these birds were on their breeding grounds, for the Bachman's Warbler is one of our earliest warbler migrants, arriving in southern United States in March and is on its breeding grounds in Dunklin Co., Mo., by the middle of April. Nests with eggs were found by Mr. O. Widmann in Dunklin Co. as early as May 14 (1898). This extends the range of Bachman's Warbler about 100 miles to the northwest. The most surprising thing, especially in the case of the Shannon Co. bird, was that they should have been found in a locality so totally different in character from that of their previously known breeding haunts. The Shannon Co. bird was in some low bushes in the dry stream bed of Spring Valley (Twp. 29, R. 5, Section 5). The Grandin bird was in a dense, wooded thicket in the valley of the Little Black River — a more suitable situation, though still in a hilly and comparatively dry country. The latter bird was like a will-o'-the-wisp, leading me on, singing just ahead of me and keeping out of sight except for an occasional fleeting glimpse. Then he would stop singing for ten or fifteen minutes at a time, only to begin again back where I had first heard him. Once he suddenly appeared in the lower branches of a small tree within fifteen feet of me, and seemed utterly unmindful of my presence though I was in full view, foraging busily and silently among the leaves near the ends of the branches. Though he spent most of his time feeding and singing in shrubs and bushes, he would occasionally mount well up into the branches of some of the taller trees and sit quietly singing. After I had spent over two hours there patiently watching and waiting, I shot him while he was pouring out his song about 35 feet up in an oak. The song to my ear is very similar to that of the Worm-eating Warbler. I felt confident that I heard another male singing at the same time, but as none were seen or heard on several later visits to the same locality, I may have been mistaken.

*104. *Helminthophila pinus*. BLUE-WINGED WARBLER.—Common. The first one was seen at the Current River, Shannon Co., April 20, and they appeared in the vicinity of our camp April 24.

*105. *Helminthophila leucobronchialis*. BREWSTER'S WARBLER.^{1, 2}—On May 12 I secured in Shannon Co. an absolutely typical specimen of the Brewster's Warbler (No. 1531, ♂, Coll. L. B. and E. S. W.). The entire underparts are pure white without even a suggestion of any yellow wash. The back is bluish gray slightly tinged in the middle with greenish. A single, broad wing-patch of canary yellow. Its song was similar to that of *H. chrysoptera*. This is the first Brewster's Warbler to be recorded from Missouri or from west of the Mississippi River.

*106. *Helminthophila rubricapilla*. NASHVILLE WARBLER.—Arrived in Shannon Co. April 28 and were fairly common. The last were seen May 17 at Grandin, Carter Co.

¹ Auk, Vol. XXIV, p. 348.

² Widmann, Prelim. Cat. Birds Mo., p. 216.

*107. *Helminthophila peregrina*. TENNESSEE WARBLER.— Arrived April 25, became common April 29, and from May 9 till I left Shannon Co. (May 15) they were by far the most abundant of all the warbler family. I found them abundant at Grandin, Carter Co., May 16 and 17 and the last was seen May 25. On May 2 I secured a male Tennessee Warbler in Shannon Co., which had a number of coppery-chestnut feathers in its crown, similar to those of a Nashville Warbler. In all other respects it was a typical Tennessee Warbler (No. 1500, ♂, Coll. L. B. and E. S. W.).¹

*108. *Compothlypis americana ramalinæ*. WESTERN PARULA WARBLER.— First seen April 20, when I found it abundant in the valley of the Current River, Shannon Co. In the vicinity of our camp, I saw it only 3 times; one on April 23, several April 24, and one April 26. At Grandin, it was a rather rare summer resident. The three specimens secured April 20, May 17 and May 30 were identified by Mr. H. C. Oberholser as belonging to this form.

*109. *Dendroica tigrina*. CAPE MAY WARBLER.²— A single individual was seen and secured May 10 and another May 15, both of them near Alley, Shannon Co.

110. *Dendroica æstiva*. YELLOW WARBLER.— First seen April 25, and became fairly common on and after May 3.

*111. *Dendroica coronata*. MYRTLE WARBLER.— Single individuals were seen at Grandin, Carter Co., March 8, and in Shannon Co., March 21 and April 4. The first two and possibly all three may have been winter residents, for the transients did not appear till April 13. They were common until May 4 in Shannon Co., and the last were seen May 17 at Grandin.

112. *Dendroica maculosa*. MAGNOLIA WARBLER.— In Shannon Co. the Magnolia Warbler appeared to be a rare migrant, for I met with it only twice — May 9 and 15. Mr. W. G. Savage reports it as fairly common at Monteer. At Grandin, Carter Co., I found it May 16 and 17.

*113. *Dendroica cerulea*. CERULEAN WARBLER.— Arrived April 27 and was fairly common in Shannon Co. In Carter Co. I found it in small numbers in the river valleys.

114. *Dendroica pensylvanica*. CHESTNUT-SIDED WARBLER.— Not common. Single individuals were seen in Shannon Co., May 9, 10, 11 and several May 13. At Grandin several were seen May 16 and 17.

*115. *Dendroica castanea*. BAY-BREASTED WARBLER.³— None were seen in Shannon Co. (See supplementary list.) At Grandin I found it May 16, 17 and 21, one each day.

*116. *Dendroica striata*. BLACK-POLL WARBLER.— A common transient. Arrived, Shannon Co., May 9. The last were seen at Grandin May 23.

¹ Auk, Vol. XXIV, p. 348

² Widmann, Prelim. Cat. Birds Mo., p. 221.

³ Ibid., p. 227.

117. *Dendroica blackburniae*. BLACKBURNIAN WARBLER.¹—A rare migrant. One was seen in Shannon Co. May 13, and at Grandin one May 16, and several May 17.

*118. *Dendroica dominica albilora*. SYCAMORE WARBLER.²—Not common in Shannon Co. Arrived March 28. They were fairly common in Carter Co. These birds were invariably found high up in pines on top of the ridges. None were seen or heard in the valleys, even where there were plenty of sycamores.

119. *Dendroica virens*. BLACK-THROATED GREEN WARBLER.—Not common. Single birds were seen in Shannon Co. on May 1, 4 and 10 and several on May 12 and 13. At Grandin one was seen May 17.

*120. *Dendroica vigosii*. PINE WARBLER.^{3, 4}—The Pine Warbler was already present on my arrival at Grandin March 8, and in Shannon Co. March 10. It was common throughout my stay in Shannon Co. in the pine woods. I found no nests, but saw the birds gathering nesting material and carrying it up into the pines several times in the latter part of March, and on April 25 a nestling was secured, too young to fly, which had fallen from its nest and was being fed on the ground by its parents. I also found a number of full-grown young birds in nestling plumage before the middle of May, so there can be no question that it is a common summer resident in this region.

*121. *Dendroica discolor*. PRAIRIE WARBLER.—Arrived April 24 in Shannon Co., and became common on and after April 26. Common at Grandin.

122. *Seiurus aurocapillus*. OVENBIRD.—Arrived April 19 and became abundant April 26. Common in both Shannon and Carter Cos.

*123. *Seiurus noveboracensis notabilis*. GRINNELL'S WATERTHRUSH.⁵—A common transient. The first were seen in Shannon Co. May 9, and the last (one) at Grandin May 24. The three specimens secured May 9, 12 and 21, were identified by Mr. H. C. Oberholser as belonging to this subspecies.

*124. *Seiurus motacilla*. LOUISIANA WATERTHRUSH.—First seen March 21.⁶ I found it common in the Current River valley April 19 and 20. None were seen after May 2, though they would probably have been found along the Current River had I revisited it. At Grandin I saw none at all.

*125. *Oporornis formosa*. KENTUCKY WARBLER.—Arrived April 28 and was common thereafter.

*126. *Oporornis philadelphia*. MOURNING WARBLER.⁷—A specimen secured May 13 at Eudy, Shannon Co., was the only one seen.

¹ Widmann, Prelim. Cat. Birds Mo., p. 229.

² *Ibid.*, p. 230.

³ *Ibid.*, p. 231.

⁴ Auk, Vol. XXIV, p. 348.

⁵ Widmann, Prelim. Cat. Birds Mo., p. 234.

⁶ *Ibid.*, p. 235.

⁷ *Ibid.*, p. 237.

*127. *Geothlypis trichas brachidactyla*. NORTHERN YELLOW-THROAT. — Arrived April 29. Was rather rare in Shannon Co., but common at Grandin.

*128. *Icteria virens*. YELLOW-BREASTED CHAT. — Arrived April 27 and became very common on and after May 3.

*129. *Wilsonia mitrata*. HOODED WARBLER. — Rare. Only met with twice in Shannon Co. — April 29 and May 15 (Jack's Fork). None were seen at Grandin.

*130. *Wilsonia pusilla*. WILSON'S WARBLER. — A specimen secured May 9 was the only one seen in Shannon Co.

At Grandin they were fairly common from May 16 to 20 inclusive.

131. *Wilsonia canadensis*. CANADIAN WARBLER. — None were seen in Shannon Co., possibly because I left (May 15) before they arrived there (see supplementary list). At Grandin I found them common from May 16 to 20 inclusive.

132. *Setophaga ruticilla*. AMERICAN REDSTART. — None were seen in Shannon Co. till May 12, and thereafter but two or three each day until my departure, May 15. At Grandin they were common on May 16 and 17, but none were seen thereafter, so it would appear that they do not breed in this region.

*133. *Mimus polyglottos*. MOCKINGBIRD. — The wilds of the Ozarks had evidently no attraction for this bird, for I saw none till I reached Winona, Shannon Co., where I found them common May 15 and 16. At Grandin only one Mockingbird was seen — May 17.

134. *Dumetella carolinensis*. CATBIRD. — Rare. In Shannon Co. one was seen April 30 and another May 4. At Grandin several were noted May 17.

135. *Toxostoma rufum*. BROWN THRASHER. — First one was seen March 31. They were not common, and were seen very irregularly in Shannon Co. At Grandin it was fairly common.

*136. *Thryothorus ludovicianus*. CAROLINA WREN. — Resident, but not very common in Shannon Co., confining themselves to the larger valleys. They were fairly common at Grandin.

*137. *Thryomanes bewickii*. BEWICK'S WREN. — First one was seen in Shannon Co., March 17. They were common from March 23 to March 30 inclusive all through the forest, but after that were rarely seen and then about houses only. At Grandin they were common.

138. *Troglodytes ædon aztecus*. WESTERN HOUSE WREN. — Rare. One was seen in Shannon Co. April 25 and another April 28. Unfortunately neither specimen was secured, but as Missouri lies within the range of the western form, I have assigned the above birds to this subspecies.

*139. *Nannus hiemalis*. WINTER WREN. — Rare. Two were seen March 23, one April 3,¹ two April 10, and one April 21, all in Shannon Co.

*140. *Cistothorus stellaris*. SHORT-BILLED MARSH WREN.² — On May

¹ Widmann, Prelim. Cat. Birds Mo., p. 250.

² *Ibid.*, p. 251.

14 I secured a female Short-billed Marsh Wren in some witch-hazel bushes in the dry creek-bed of Spring Valley, Shannon Co. Considering the fact that this was in a dry, heavily-wooded and mountainous region with no marshes within many miles, this record is very surprising.

*141. *Telmatodytes palustris iliacus*. PRAIRIE MARSH WREN.¹—On May 9, in Shannon Co., I saw three Prairie Marsh Wrens in as many different places and several miles apart, securing two of them. Finding these birds here was as surprising as in the case of the Short-billed Marsh Wren, and for the same reason.

142. *Certhia familiaris americana*. BROWN CREEPER.—Probably a winter resident in Shannon Co. I found it March 11 and it was fairly common till April 24 when the last were seen.

143. *Sitta carolinensis*. WHITE-BREASTED NUTHATCH.—A common resident.

*144. *Sitta canadensis*. RED-BREASTED NUTHATCH.²—Probably a winter resident in the pine region of Shannon Co., but not common. I found it March 11, 14, 24, 30; April 6, 17, 27; May 1, 9 and 12. Shannon Co.

*145. *Sitta pusilla*. BROWN-HEADED NUTHATCH.^{3,4}—On March 19 I secured a pair of Brown-headed Nuthatches in some pines on the edge of a clearing in Black Valley, Shannon Co. The female was flying back and forth to an old, dead pine in a cornfield and seemed much disturbed after I had shot her mate. The only other record for this bird in Missouri is a bird seen by Mr. O. Widmann in St. Louis, May 6, 1878 and reported in Nut. Bull., Vol. V, p. 191.

*146. *Bæolophus bicolor*. TUFTED TITMOUSE.—A common resident.

*147. *Penthestes carolinensis*. CAROLINA CHICKADEE.—A common resident.

*148. *Regulus satrapa*. GOLDEN-CROWNED KINGLET.—Common until April 23, when the last were seen. Found at Grandin March 8.

*149. *Regulus calendula*. RUBY-CROWNED KINGLET.—A common transient in Shannon Co. First seen March 19,⁵ and last seen May 4.

*150. *Polioptila cærulea*. BLUE-GRAY GNATCATCHER.—Common in Shannon Co., arriving April 12. They were abundant throughout the forest from May 4 to 7 inclusive.

Fairly common at Grandin.

151. *Hylocichla mustelina*. WOOD THRUSH.—Common. Arrived in Shannon Co. April 25.

*152. *Hylocichla aliciae*. GRAY-CHEEKED THRUSH.—Common in Shannon Co. April 28 to May 13 inclusive.

¹ Widmann, Prelim. Cat. Birds Mo., p. 252.

² *Ibid.*, p. 254.

³ Auk, Vol. XXIV, p. 349.

⁴ Widmann, Prelim. Cat. Birds Mo., p. 255.

⁵ *Ibid.*, p. 258.

*153. *Hylocichla ustulata swainsonii*. OLIVE-BACKED THRUSH.—A common transient. Arrived April 29 in Shannon Co., and was fairly common till May 25¹ on which date the last were seen at Grandin.

*154. *Hylocichla guttata pallasii*. HERMIT THRUSH.²—Not common. First one was seen March 26, and last, April 27. Shannon Co.

155. *Planesticus migratorius*. AMERICAN ROBIN.—Already present on my arrival in Carter Co. March 7, and in Shannon Co. March 10. The Robin was common as a transient in March, but rare as a summer resident in both Shannon and Carter Cos. I found a nest with 4 eggs in an apple orchard at Eudy, Shannon Co., May 13.

156. *Sialia sialis*. BLUEBIRD.—Already present on my arrival in Carter Co. March 7, and Shannon Co. March 10, and was fairly common about clearings.

Supplementary List.

The following are the additional records for Shannon County kindly furnished me by Mr. W. G. Savage. Those in brackets are species which are noted in the foregoing list as found by me in Carter County, but not in Shannon.

157. *Podilymbus podiceps*. PIED-BILLED GREBE.—Rather rare.
158. *Larus argentatus*. HERRING GULL.—Rare. Observed twice in four years.
159. *Pelecanus erythrorhynchos*. AMERICAN WHITE PELICAN.—Rare.
160. *Anas boschas*. MALLARD.—Fairly common.
161. *Nettion carolinensis*. GREEN-WINGED TEAL.—Fairly common.
162. *Dafila acuta*. PINTAIL.—Fairly common.
163. *Marila collaris*. RING-NECKED DUCK.—Rare.
164. *Porzana carolina*. SORA.—Rare.
165. *Fulica americana*. AMERICAN COOT.—Rather rare.
166. *Gallinago delicata*. WILSON'S SNIFE.—Rare. Only seen once.
167. *Totanus melanoleucus*. GREATER YELLOW-LEGS.—Rare. Only seen twice.
168. *Bartramia longicauda*. BARTRAMIAN SANDPIPER.—Rare.
169. *Oxyechus vociferus*. KILLDEER.—Rare.
170. *Ictinia mississippiensis*. MISSISSIPPI KITE.—Rare. Observed two or three times in four years.
171. *Circus hudsonius*. MARSH HAWK.—Rather rare. Observed two or three times each year in four years.
172. *Accipiter cooperi*. COOPER'S HAWK.—Tolerably common. Very shy.

¹ Widmann, Prelim. Cat. Birds Mo., p. 263.

² *Ibid.*

173. *Buteo borealis harlani*. HARLAN'S HAWK.—Rare. Only observed a few times.

174. *Buteo lineatus*. RED-SHOULDERED HAWK.—Common. Observed mostly in spring and fall.

175. *Buteo swainsoni*. SWAINSON'S HAWK.—Fairly common.

176. *Haliaeetus leucocephalus*. BALD EAGLE.—Rather rare. Observed four or five times a year for four years.

177. *Otus asio*. SCREECH OWL.—Very abundant.

178. *Bubo virginianus*. GREAT HORNED OWL.—Fairly common. Observed in winter only, from ten to twenty times each winter for four years.

[24. *Coccyzus erythrophthalmus*. BLACK-BILLED CUCKOO.]—Rare.

[34. *Caprimulgus carolinensis*. CHUCK-WILLS-WIDOW.] Rare. Only heard twice in four years. (See preceding list.—E. S. W.)

Phalaenoptilus nuttalli (?). POOR-WILL (?).—"Am reasonably certain of hearing the Poor-will once." W. G. S.

179. *Nuttallornis borealis*. OLIVE-SIDED FLYCATCHER.—Rather rare. Observed from one to three times each year for four years.

180. *Spizella monticola*. TREE SPARROW.—Rather rare. From 8th to 10th of February of each year for the last three years, have observed from 2 to 8.

181. *Guiraca caerulea*. BLUE GROSBEAK.—Common. Breeding quite abundantly.

182. *Petrochelidon lunifrons*. CLIFF SWALLOW.—Rather rare. Only observed in spring and fall.

183. *Riparia riparia*. BANK SWALLOW.—Rare. Only identified two or three times in four years.

[94. *Bombycilla cedrorum*. CEDAR WAXWING.]—Fairly common. May be looked for any time of year in small flocks, except in June and July.

184. *Vireosylva gilvus*. WARBLING VIREO.—Very rare. Only heard once.

185. *Vireo belli*. BELL'S VIREO.—Rare. Only observed a few times here.

186. *Protonotaria citrea*. PROTHONOTARY WARBLER.—Rather rare. Observed three or four times in four years.

187. *Helminthophila chrysoptera*. GOLDEN-WINGED WARBLER.—Rare.

[115. *Dendroica castanea*. BAY-BREASTED WARBLER.]—Rather rare.

188. *Dendroica palmarum*. PALM WARBLER.—Rare. Only observed two or three times here in four years.

[131. *Wilsonia canadensis*. CANADIAN WARBLER.]—Rather rare. Observed several times in four years. Not seen in fall.

189. *Hylocichla fuscescens*. WILSON'S THRUSH.—Rare. Only observed two or three times. (This may have been the western form—the Willow Thrush [*H. f. salicicola*], as Missouri must lie within the range of the latter.—E. S. W.)

GENERAL NOTES.

Occurrence of a Dovekie at Port Washington, Wis.—On January 11, 1908, some boys hunting along the ice fringe of Lake Michigan at Port Washington, about twenty-five miles north of Milwaukee, shot a bird which was strange to them and which they carried to Dr. C. W. Beemer of that town for identification. Dr. Beemer correctly determined it as a Dovekie (*Alle alle*) and had it mounted by a local taxidermist. He has since presented it to the Public Museum of the City of Milwaukee. The sex was not determined. The bird appears to be an adult in ordinary winter plumage.

I believe that this is the first record for this bird as far west in the United States as Wisconsin. Its presence was presumably accidental, storm-driven, rather than a voluntary straying from its coastwise habitat.—HENRY L. WARD, *Milwaukee, Wis.*

An Addition to the Birds of Iowa.—The Museum of Natural History of the University of Iowa, at Iowa City, obtained a fine female specimen, in good plumage, of the Long-tailed or Arctic Jaeger (*Stercorarius longicaudus*), which was captured near Lone Tree, Johnson County, Iowa, on or about June 15, 1907. The bird was seen flying around with the pigeons on the farm of Mr. Charles Prizler, near Lone Tree, and a shot from his gun broke the bird's wing and enabled Mr. Prizler to capture it alive. The bird was brought to Iowa City and presented to Professor C. C. Nutting, of the department of Zoölogy, and identified by him. I saw the bird two or three days later, after it had been mounted by Mr. Homer R. Dill, the University taxidermist, and verified the measurements and identity. The coloration and measurements are those of the typical adult, as given in Coues's 'Key' and Ridgway's 'Manual.' I know of no previous record of the occurrence of the Long-tailed Jaeger in Iowa, although its congener, *Stercorarius parasiticus*, has been taken at least twice; once on the Mississippi at Keokuk, Oct. 6, 1896, and preserved by Mr. Wm. G. Praeger, and one specimen at Eagle Lake, Hancock County, Sept. 20, 1905, and now in the Coe College collection at Cedar Rapids, Iowa, recorded by Dr. B. H. Bailey.—RUDOLPH M. ANDERSON, *Macon, Missouri.*

The Black Tern at Camden, N. J., and Philadelphia, Pa.—In 'The Auk' for April, 1907, page 211, I recorded the observation of a Black Tern (*Hydrochelidon nigra surinamensis*) on the Delaware River at Philadelphia, Pa., but as the bird was not taken there appears to be some doubt, in the minds of some ornithologists, at least, as to the reliability of my identification, and in this connection I would like to assure the most incredulous that I made no mistake, for if I had been in the least doubt, I certainly would never have recorded its occurrence. However, I am now able to

record the actual capture of the Black Tern on the Delaware River in the vicinity of Philadelphia, which ought to satisfy the most doubting that this bird does occasionally occur in this locality.

On September 5, 1907, Mr. Richard C. Harlow, of Edge Hill, Pa., and the writer saw about 75 Black Terns, while gunning on the Delaware River, behind Petty's Island, at Camden, N. J., which is opposite Philadelphia, and secured six immature birds. In fact, all seen were juveniles. On September 10, about 50 Black Terns were seen by us at the above locality, and also at Philadelphia, and eight were taken. As before, all seen and shot on this day were immature birds. On the 5th they kept behind the island along the Jersey shore marshes, but on the 10th several were seen elsewhere than out on the river, and often observed resting on pieces of driftwood, singly, in pairs, and threes, floating with the tide.

The specimens taken are in Mr. Harlow and the writer's collection, except two which were given to Mr. Witmer Stone, and fill a gap in his fine collection of local birds. The Terns were undoubtedly a migrating flock driven inland by a recent storm.—RICHARD F. MILLER, *Philadelphia, Pa.*

Another Capture of a Tagged Duck.—In 'The Auk' for January, 1908 (Vol. XXV, p. 80), Mr. Henry Oldys calls attention to the capture of a hen Canvasback Duck on October 25, 1907, at Manahawkin Bay, New Jersey, on whose leg was an aluminum band marked 'T. J. O. D. 48.' In 'Forest and Stream,' November 16, 1907, there is recorded the shooting of a female Redhead Duck in the first week of November, 1907, at Beach Haven, New Jersey, which had a similar band on its leg marked 'T. J. O. D. 49.' It would be of interest to learn where, how, when and by whom these birds were banded.—E. SEYMOUR WOODRUFF, *State Forester, Albany, N. Y.*

The Cinnamon Teal (*Querquedula cyanoptera*) on the Coast of South Carolina.—In 'The Auk,' Vol. XXIV, 1907, p. 157, Mr. William Brewster has shown that the bird I recorded (Auk, Vol. XXII, 1905, p. 396) as a representative of this species is really the Blue-winged Teal (*Querquedula discors*). Upon verifying some ducks in the Charleston Museum recently, I noticed a specimen bearing the following label, written by the late Dr. Gabriel E. Manigault, when he was the curator: "Blue-winged Teal *Querquedula discors* ♀." The extreme narrowness of the bill at once arrested my attention, it measuring but .50 of an inch, and the culmen (from feathers), 1.67. Although there is no locality on the label, the specimen was unquestionably bought of one of the game dealers in the Charleston market by Dr. Manigault, who daily visited the market during the winter months for the purpose of securing ducks for the Charleston Museum. This specimen, I am certain, is really a representative of *Querquedula cyanoptera* and was evidently killed on the Cooper River, the supply of ducks for the market usually coming from that region.

This duck was mounted by the late Mr. John Dancer, who was employed by Dr. Manigault to mount birds for the Charleston Museum, and was taken probably in the winter of 1884 or 1885.

Dr. Manigault was not in the habit of affixing localities to specimens (despite my protestations) taken in South Carolina, for he regarded the Charleston Museum as not a museum of science, but one to attract the public generally.

Although the specimen is labeled "♀" there can be little doubt that it is a young ♂, for the speculum is rich, uniform green.—ARTHUR T. WAYNE, *Honorary Curator Div. Birds, Charleston Museum.*

Barrow's Golden-eye (*Clangula islandica*) in Massachusetts.—As this bird seems to be of rare occurrence in Massachusetts I would like to call attention to its having been taken at Nantucket on December 17, 1906. It was a male specimen in the adult plumage and was shot by Charles C. Chadwick, a native of the island, and whom I have had occasion to go shooting with several times. The bird was shot at the eastern end of the harbor where there is an opening into the ocean known as Haulover Break. At daylight and until sunrise a large flight of sea fowl streams through here on their way to the feeding grounds in the harbor. They consist mostly of White-winged Scoters (*Oidemia deglandi*), American Golden-eyes (*Clangula clangula americana*), Old-squaws (*Harelda hyemalis*), and a few Red-breasted Mergansers (*Merganser serrator*); this latter bird being very common later on in the spring. The bird in question was shot at this time during the flight, and was flying singly. Chadwick was unable to identify the specimen but supposed it to be a freak *Clangula clangula americana*. He showed it to several of the oldest gunners on the island but none had ever seen one like it before. Unfortunately the bird was destroyed in ignorance. I have been unable to find any recent records of the capture of this bird in Massachusetts and I believe it is considered a rare bird here, though a few are occasionally taken in Maine.—S. PRESCOTT FAY, *Boston, Mass.*

The Whistling Swan (*Olor columbianus*) in South Carolina.—I am indebted to Dr. Jonathan Dwight, Jr., for the gift of a bird of this species taken at Ridge Springs, Edgefield County, on November 26, 1907. The specimen was shot in a small pond and seemed to be very tired. It was sent by Dr. L. J. Smith to Mr. James P. Garick, Jr., of Weston, S. C., to be mounted, who (the latter) upon learning of my desire to obtain it for my collection kindly used his influence in my behalf. Mr. Garick informs me that the bird was greatly emaciated, in fact 'skin and bone,' but despite its condition it measured (in flesh) 52 inches in length and 84 inches in extent.

This Swan, although a *young* male and doubtless a bird-of-the-year, has the legs and feet deep *black* as in the *adult*.

In Audubon's 'Birds of America,' Vol. VI, p. 232; Baird, Brewer and Ridgway, 'Water Birds,' Vol. I, p. 425; Coues's 'Key to N. A. Birds,' p. 683; Ridgway's 'Manual of N. A. Birds,' p. 120, and Chapman's 'Birds

of Eastern North America,' p. 124, the color of the feet of the *young* is described as "yellowish flesh-color," "grayish, or whitish," and by the last-named author as "light."

Although the Whistling Swan winters in great numbers on the northern coast of North Carolina, there are but few authentic records of the capture of these magnificent birds for this State.—ARTHUR T. WAYNE, *Mount Pleasant, S. C.*

Capture of the King Rail in Massachusetts.—I would like to report the taking of a fine male King Rail (*Rallus elegans*) on October 10, 1907, on the Charles River marshes, Needham, Mass. The bird has remarkably fine plumage for that season of the year, and was extremely fat.—FRED. H. KENNARD, *Boston, Mass.*

Nesting of the King Rail in Philadelphia County, Pa.—The King Rail (*Rallus elegans*) is a very rare breeder nowadays — if it ever was a common one — in the Delaware Valley and the discovery of a nest is worth reporting, especially when found in the vicinity of Philadelphia, and particularly within the city limits. Bridesburg, on the Delaware River, is about five miles from the City Hall and well within the city limits. In the meadows at this locality it was my good fortune to find a King Rail's nest on June 3, 1902. It was placed half a foot up in a clump of reeds, two feet high in a shallow marsh, woven to the blades and stalks, the tops being pulled down and interwoven into the nest and formed a sort of arch over it. It contained two fresh eggs, which were taken and are still in the writer's collection, probably the only eggs of *Rallus elegans* from Philadelphia in collections.

A week or so later the dead rail was found in a ditch near the nest and its skull (which I still have) collected; the bird being partially decomposed, it was useless as a skin or for mounting.

On June 26, 1907, I found a deserted King Rail's nest not a square away from the site of the other, placed on muddy water in a shallow marsh amid tussocks and tain and scattered stalks of cat-tails, along the edge of a cat-tail marsh.

These are the only King Rail's nests I have been able to find in North Philadelphia, after diligent search for them during the past six years.—RICHARD F. MILLER, *Philadelphia, Pa.*

Virginia Rail and Kentucky Warbler in New Jersey.—In the January issue of 'The Auk' I noted Mr. Hunt's observations of these species on the Pensauken Creek, New Jersey. A few words on this subject may not be amiss, as I fear a wrong impression of the rarity of these species is given here. The Virginia Rail is rarely observed by the casual ornithologist, but nevertheless it is a perfectly regular summer resident in suitable marshes throughout the Delaware Valley. In my several trips to the Pensauken region I have not infrequently observed or heard the Virginia Rail and

have not the slightest doubt but that a careful search will prove it decidedly common in that locality.

Mr. Hunt's record of the Kentucky Warbler is considered by him to be the only record from southern New Jersey. On July 3, 1904, I observed two individuals of this species at Manahawkin, a locality still more southern than Pensauken where I again observed it on May 21, 1907. Though undoubtedly rare, it is probably of regular occurrence.—RICHARD C. HARLOW, *Edge Hill, Pa.*

***Rallus virginianus* Breeding in the Delaware Valley.**—In 'The Auk' for January, 1908, p. 81, a correspondent appears to infer that the nesting of the Virginia Rail is rare in the location above mentioned. I find already recorded the nesting of this species as follows: In the 'Abstract of Proceedings of Delaware Valley Ornithological Club, Vol. IV, p. 5, three nests on the Delaware marshes below Philadelphia. In 'Cassinia' for 1903, p. 51, two nests at Richmond, Philadelphia, in the river marshes. In 'The Oologist,' Vol. III, p. 46, there is a record of five nests of this bird found in Chester County, Pa. One of these sets is in my collection. In 'The Oologist,' Vol. IV, p. 2, two additional nests are recorded from the same locality. This bird breeds not uncommonly in the extensive marshes along the Delaware River and its tributaries to at least twenty-five miles south of Wilmington, Del. I have a set of 7 eggs collected near Odessa, Del., July 19, 1903, and I have seen the bird in the nesting season near Rehoboth, Del., just below Cape Henlopen, and almost one hundred miles south of Philadelphia, Pa.—C. J. PENNOCK, *Kennett Square, Chester County, Pa.*

Nesting of the Virginia Rail in Philadelphia County, Pa.—During ten years or more of persistent search the writer has failed to find more than two nests of the Virginia Rail (*Rallus virginianus*) in north Philadelphia County, Pa., and consequently regards the bird as a rare summer resident. The two nests in question were found on May 28, 1903, in a marsh at Richmond, Philadelphia, well in the city limits, and to my chagrin they were subsequently deserted.

Several times the birds have been since seen during the summer, and a diligent search made for their nests, but without success.—RICHARD F. MILLER, *Philadelphia, Pa.*

Nesting of the Coot in Philadelphia County, Pa.—The Coot (*Fulica americana*) is a common transient in the Delaware Valley, and has always been regarded as such by the writer, despite suspicious stories of its occurrence during summer told to me by gunners of questionable veracity. This was my belief until the summer of 1906, when I learned of the undoubted breeding of the Coot in this district.

On August 21, 1906, a gunner observed a Coot with six half grown young swimming together in a reedy tide-water pond at Richmond, Philadelphia,

not more than five miles from the City Hall, and well within the city limits. His description of the birds — Chicken-billed Ducks he called them — precluded any doubt as to their identity, the white frontal shield plate of the adult being a conspicuous identification mark.

On the same day another gunner shot a Coot on this pond whose identity was ascertained by the writer, thus confirming the observation of the other gunner, and proving conclusively that the Coot bred here. The following year, 1907, I hunted in vain for a Coot's nest in the marsh, in fact did not see a bird nor hear of any being shot in it.

This is the only record of the Coot breeding in the vicinity of Philadelphia known to me.— RICHARD F. MILLER, *Philadelphia, Pa.*

American Woodcock Breeding at Saint Marys, Ga.— Although a friend some few years ago told me that he had seen an American Woodcock (*Philohela minor*) with small young, about twenty-five miles from here on the Satilla River, I have found the bird so rare, even during winter, that I had about decided that he was mistaken. I was therefore both surprised and pleased on the morning of March 9, 1908, to flush a bird from a set of four eggs while riding through a thicket of bushes about three feet high in a rather low place on the edge of a swamp. I was riding slowly at the time, trying to identify a small bird, and my horse's feet were almost in the nest before the bird quit it, rose above the bushes and settled down again about twenty feet away. The nest was of leaves and a little pine straw, and I found that incubation would have been over in a few days, but managed to save the eggs. The nest was about four miles from Saint Marys, and the Florida line, which I believe is the most southerly breeding record for the bird. Have only seen one other bird this year.— ISAAC F. ARNOW, *Saint Marys, Ga.*

The Lesser Yellow-leg in Philadelphia County, Pa.— On May 13, 1901, at Frankford, Philadelphia County, Pa., I saw a flock of six Lesser Yellow-legs (*Totanus flavipes*) feeding in a shallow ditch bordering a large wood and wading about, often belly-deep, in the water in quest of food. They were watched for about ten minutes and were quite tame, allowing a close approach. When flushed they took wing together, uttering their characteristic shrill cries as they rose and circled around, and then flew off northward.

The Summer Yellow-leg is only mentioned in Stone's 'Birds of Eastern Pennsylvania and New Jersey' as "Common transient on the coast and less frequent on the larger streams" (p. 76). There are no reliable records of its occurrence in the vicinity of Philadelphia, and Fowler in his 'Water Birds of the Middle Delaware Valley' (Cassinia for 1903, p. 43) does not mention the bird. When I contributed my notes to Mr. Fowler regarding the Water Birds of Frankford and Vicinity I overlooked the observation of this species, consequently it was not recorded in his excellent paper.— RICHARD F. MILLER, *Harrowgate, Philadelphia, Pa.*

Breeding of the Acadian Owl in Newton County, Indiana.— Another actual breeding record of the Saw-whet Owl (*Nyctala acadica*) in Indiana will doubtless be of interest, at least to local ornithologists. In July, 1907, I saw at a farm between Kentland and Effner, not far from the Illinois line, a family of these birds, parents and several young. The people living on the farm had watched the development of the family throughout the summer, and the birds being very tame I was able to observe them, during the late afternoon hours, at close range. The nesting site was in a lawn shade tree close to the house.— N. HOLLISTER, *Biological Survey, Washington, D. C.*

Glaucidium vs. Noctua — A Correction.— In 'The Auk,' Vol. XXIV, p. 192, I proposed to substitute *Noctua* S. G. Gmelin, 1771, for *Glaucidium* Boie, 1826, on the supposition that they were based upon the same species. Gmelin based his genus upon *Noctua minor* Brisson which is a "*Glaucidium*" and the case seemed clear enough. Unfortunately for my argument there is sometimes a difference between what an author has and what he thinks he has; and the plate which was lacking in the volume of the Nov. Com. Sci. Petr., XV, in the Academy library, but which I have since examined in Washington, shows Gmelin's bird to have been a Short-eared Owl, *Asio accipitrinus*, and not the "*Noctua minor* Briss" at all! A genus based upon a misidentified species is liable to cause a great deal of trouble, and our only safe course seems to be to let the case rest wholly upon the published evidence. Had there been no plate in this case my proposed change would have been inevitable, but the plate saves the day for *Glaucidium*.— WITMER STONE, *Academy of Natural Sciences, Philadelphia, Pa.*

European Starlings (*Sturnus vulgaris*) in Pennsylvania, New Jersey, and Delaware.— In July, 1904, through Prof. H. A. Surface, State Zoölogist of Pennsylvania, I was placed in correspondence with Dr. W. H. Ridge of Trerose, Bucks Co., Pa., relative to a pair of curious birds that had established themselves near his house. The birds, which proved to be Starlings, arrived in the spring of 1904 and raised a brood in a hole in the cornice of the house. The young left as soon as they were able to fly, while the old ones remained until the following February when they, too, left. Nothing has been seen of them since. In spite of Prof. Surface's adverse report on their desirability, Dr. Ridge declares that while he likes Martins he would prefer the Starlings if he could only get them back.

In March, 1905, Miss F. L. Twaddell wrote to me of some interesting birds that had occurred at intervals all winter on her grounds in West Philadelphia and about Woodland Cemetery. These also proved to be Starlings, and are still present. In March, 1907, they nested in a Flicker's hole, after driving the Flickers away, and raised a brood. Miss Twaddell has never seen more than four or five at one time, presumably the original pair and three young.

A letter from Miss Anna P. Hannum, dated February 3, 1908, reports the

arrival of a flock of Starlings at Vincentown, N. J., at the home of Mr. Lewis Prickett, about two years ago. The birds have remained ever since, nesting in bird boxes and about the barn, and are highly prized by the residents of the farm.

Other Starling records that have come to my notice are a bird examined in the shop of Mr. Axe, a Philadelphia taxidermist, by Mr. R. F. Miller, shot early in November, 1907, along with another individual at Tacony, Philadelphia, on the Delaware. A specimen in the possession of Mr. Philip Laurent, was shot on the Meadows below Philadelphia, December 15, 1907, by David Bouvier; five others were seen at the same place December 22.

A specimen now in the Academy collection, was shot from a flock at Tuckerton, N. J., by Mr. Joseph Sapp, early in December, 1907.

Mr. C. J. Pennock writes me that the bird has also reached Delaware. He examined one of three that were shot on the Bay Shore near Smyrna, November 15, 1903. A large flock was seen in the same vicinity about ten days later.—WITMER STONE, *Academy of Natural Sciences, Philadelphia, Pa.*

Another Clarke's Crow taken in Missouri.—Mr. E. A. Dodge of Louisiana, Pike Co., Mo., sent me a photograph of a Clarke's Crow, *Nucifraga columbiana* (Wils.), which was killed by Mr. Mike Creamer near Louisiana on October 12, 1907. It was mounted by Mr. Dodge and is now in his collection. With the exception of a specimen taken April 1, 1891, in Crittenden Co., Ark., this is the farthest eastern occurrence of the species.—O. WIDMANN, *St. Louis, Mo.*

Bobolinks Summering in Southern Pennsylvania.—Perhaps it might interest some readers of 'The Auk' to learn that for some years past there have been several localities within twenty miles of Philadelphia where the Bobolink (*Dolichonyx oryzivorus*) reared its young. Chapman, in his 'Handbook,' gives its southern summer range as "southern New Jersey," and despite assiduous searching, my efforts to find a more southerly record for the east have been vain. It is with the view of establishing a new locality that this is written.

In the summer of 1906, I spent the time from the latter part of June till the corresponding portion of July in the vicinity of Bristol, Bucks Co., Pa., and within eighteen miles of Philadelphia. Here I observed the Bobolink frequently and often saw the parents in the act of feeding the young. From reliable informers I gathered that the birds were no more abundant that year than usual. Again, in the spring of 1907, I was in the vicinity of Newtown, Bucks Co., and saw several pairs of the birds, the males in full song. Here I was in company with J. Harris Reed, and he informed me that the birds were usually to be found there throughout the summer, and that several years since he had discovered a nest in that locality. Several days later, on June 9, I spent the day on the Tinicum meadows to the south of Philadelphia, and what was my surprise to see several males (three) in full song. Again on the 14th they were seen in the same locality, which

is below the 40th parallel, North Latitude, and though I do not assert that they always summer here, I do maintain that they did during 1907.—
RICHARD C. HARLOW, *Edge Hill, Pa.*

The Savanna Sparrow Breeding in Detroit and Hamtramck Village, Michigan.—One especial ornithological feature of the season 1907 was the appearance of Savanna Sparrows (*Passerculus sandwichensis savanna*) as summer residents on territory not previously occupied by them. Prior to 1906 this sparrow was not known to breed in the county but that season I located a small colony in the village of Grosse Pointe Farms and established a positive breeding record by securing a young bird not yet able to fly well (Auk, XXIV, p. 98). The grounds extending northerly from this colony to the county line and southerly into the city of Detroit were carefully explored without result, but in 1907 this sparrow was common in all suitable places throughout this entire territory. In late May, 1906, I spent considerable time on some large commons in the eastern part of the city and carefully noted all birds, but no Savannas were present. I was again on this commons May 28, 1907, and found them all over it; six males in song being counted while standing at one point. During the noon hour I watched a female to her nest containing four slightly incubated eggs. This was about fifty yards inside the city limits on P. C. 644. In June, 1906, I frequently walked the length of a strip of meadow bordering the Detroit River in River Rouge Village and saw only Vesper Sparrows, but June 3, 1907, six pairs of Savanna Sparrows were present and frequently seen later; and thus it was with portions of Hamtramck, Springwells and Ecorse Townships. The birds were also found in many places not visited in 1906. July 30, 1907, I found this species common and in full song on Section 6, Monguagon Twp.; the southernmost point I reached during the summer. It is thus evident that the breeding range of this sparrow in numbers was extended southward in 1907—a phenomenon possibly explained by the abnormal weather conditions. I have no doubt that isolated pairs frequently nested here in former years and were overlooked. I have substantial proof of this in the possession of a set of five fresh eggs taken by Mr. Herbert H. Spicer, May 28, 1902, in $\frac{1}{4}$ Section 39, Hamtramck Village. The territory, over which the Savanna Sparrow was a summer resident in 1907, extended from the shore of Lake St. Clair and the Detroit River inland about three miles, and from the north county line southerly a distance of twenty-five miles to Section 6, Monguagon Twp., and probably further. At a few points in Gratiot and Springwells Twps., Highland Park, etc., the birds were noted from one to three miles further inland.—J. CLAIRE WOOD, *Detroit, Mich.*

The Case of *Hortulanus Vieillot*.—In my recent paper on the 'Types of Genera of North American Birds,'¹ I took the ground (*l. c.*, p. 23, footnote)

¹ A List of the Genera and Subgenera of North American Birds, with their Types, according to Article 30 of the International Code of Zoological Nomenclature. Bull. Amer. Mus. Nat. Hist., Vol. XXIV, pp. 1-50, December 26, 1907.

that *Hortulanus* Vieillot, 1807, had no standing under the new Article 30 of the International Code of Zoölogical Nomenclature, inasmuch as the author failed to designate its type when founding it, and later ignored it, transferring its three original species to other genera founded by him later, one of these species becoming the type of another genus, and the other two becoming types by subsequent designation of still other genera, the genus *Hortulanus* not having in the meantime been cited by any other author, except in synonymy, and without designation of a type. Since the publication of this dictum several correspondents have written to me taking exception to it, on the basis, apparently, that a genus properly published cannot be ignored, and if not a homonym must be retained for some one of its original species. (See A. O. U. Code, Canon XIX.)

As already shown elsewhere,¹ the three original species of *Hortulanus* are (1) *Hortulanus erythrophthalmus* (= *Fringilla erythrophthalma* Linn.), which became the monotypic type of *Pipilo* Vieill. in 1816. (2) *Hortulanus albicollis* (= *Fringilla albicollis* Gmel.), which became type by designation of *Zonotrichia* Swains. 1831 in 1832. (3) *Hortulanus nigricollis* (= *Emberiza americana* Gmel.), which became the type of *Spiza* Bonap. 1824 by subsequent designation of the founder in 1827.

If *Hortulanus* is to be retained as a properly founded generic name, the application of the rule of priority to the case would make *Fringilla albicollis* the type, and *Zonotrichia* a synonym of *Hortulanus*.—J. A. ALLEN, *American Museum of Natural History, New York City.*

The Accidental Occurrence of the Green-tailed Towhee (*Oreospiza chlorura*) in Virginia.—Mr. John B. Lewis captured a male of this species at his home, one mile west of Bower's Hill, Virginia, on January 26, 1908, which was subsequently sent to me for identification. The bird was first discovered by his fourteen year old son, in company with White-throated Sparrows, in a thicket along the edge of an open field, and Mr. Lewis stated that its actions resembled very closely those of the sparrows. Bower's Hill is about seven miles southwest of Portsmouth, and within a mile of the border of the Dismal Swamp.

So far as I can find, there is no other published record of the Green-tailed Towhee east of San Antonio, Texas.

The specimen in question, although in very poor condition when received, was immediately preserved and is now in the writer's collection.—G. C. EMBODY, *Ashland, Va.*

Type Locality of *Vireo pusillus*.—It is unfortunate that Mr. Grinnell (see Auk, January, 1908, pp. 85, 86) was not able to consult the original description of *Vireo pusillus*, for if he had done so it would have been quite clear to him that the type specimen—that is, the specimen on which the description was based—is given as "No. 16,954, Smiths. Register, ♂,

¹ Bull. Amer. Mus. Nat. Hist., XXIII, p. 360, April 15, 1907.

Cape St. Lucas." That Dr. Coues, at that time, was in the habit of designating types in connection with new species which he described is clearly shown by his action in the case of *Dendroica gracia* (p. 67), *Vireo plumbeus* (p. 74), and *V. vicinior* (p. 75). In the case of the last, only, does he take the trouble to use the word type ("Type and only known specimen No. 1507 of my collection," etc.); but even if his intent was not thus perfectly evident, the mere fact that only one specimen is mentioned in connection with his original description of the new species (*Vireo pusillus*), that from Cape St. Lucas, necessarily fixes that specimen as the type, according to the very general and perfectly correct practice in such cases. His designation, twenty-two years later, of another specimen as type may properly be regarded as a mere lapse of memory; but even if not so regarded, the answer may be made that an author has no more right to change his type of a particular species than to change its name without (in the latter case) good reasons for doing so.—ROBERT RIDGWAY, *Washington, D. C.*

Swainson's Warbler (*Helinaia swainsoni*).—On the afternoon of June 17, 1907, Mr. Howard Ray and myself had the good fortune to see, and hear, the rare Swainson's Warbler. It was found about four miles north of Du Quoin, Perry County, Illinois, in a narrow but tall and dense growth of willows, which bordered a low, wet pastureland. As we entered the thicket, our attention was attracted by the loud whistle of some new bird. Going in the direction from which the call came, we found a plain-colored warbler perched about twenty feet from the ground among the smaller branches of the willows. It did not notice us at first, but seemed to put all its spirit and energy into its song. The upper parts of this bird were olive brown, the superciliary line dull white, the under parts dusky white slightly tinged with yellow, and the crown a dull reddish brown, approaching the extreme dull color variation described by Mr. Brewster.¹ Unfortunately we had no gun with us and were unable to make a subsequent visit to that locality. There are extensive areas of low, swampy timberland along the Little Muddy River, which contain an abundance of aquatic vegetation and dense shrubbery that are doubtless attractive resorts for this swamp-loving species.

The only other record of this bird in Illinois, as far as I have been able to discover, is that made by Mr. Robert Ridgway and Mr. Brewster in the vicinity of Mount Carmel, southern Illinois, in the spring of 1878.²—ALFRED O. GROSS, *Urbana, Ill.*

Late Occurrence of the Black-poll Warbler (*Dendroica striata*) in the District of Columbia.—As is well known, the belated spring weather of 1907 affected the birds in almost every locality in the eastern United States;

¹ Auk, Vol. II, 1885, p. 87.

² Bulletin N. O. C., Vol. III, p. 163.

hence one erratic record would seem too trivial for publication, but it has occurred to me that the note I now make may possibly be of comparative interest. Black-poll Warblers are usually the last of the warblers to reach the District of Columbia in spring. They are likewise among the last to leave it. Singularly enough, in the spring of 1907 they were a little in advance of their average date of arrival. They lingered in more or less abundance throughout the first ten days of June. I recorded the last on June 16, in the grounds of the National Zoological Park. The latest record theretofore was June 6, 1875, but this was not strictly a District record, having been made at Rosslyn, just across the Potomac River, in Virginia.—R. W. WILLIAMS, JR., *Washington, D. C.*

The Cañon Wren in Colorado.—As I believe this Cañon Wren (*Catherpes mexicanus conspersus*) is considered rather rare in Colorado, the following note may be of interest. February 22, 1907, I obtained a pair of these Wrens in a small rocky gulch about two miles south of Golden. Both seemed rather shy, but after shooting the first one the other remained around the same spot so that I was able to obtain it. October 10, while in the same gulch I saw another Cañon Wren near where I had obtained the two in February. I think it probable that these birds breed in this locality and perhaps are not as rare as has been supposed.—CHARLES D. TEST, *Golden, Col.*

Red-spotted Bluethroat of Alaska.—While not at all questioning the correctness of Dr. Buturlin's opinion that the Bluethroat of Alaska is different from that of Northern Europe (see Auk, January, 1908, pp. 35-37), I wish to state that both the description and measurements in 'Birds of North and Middle America' (Vol. IV, p. 15) were taken from European specimens, and that I have not seen specimens from either Alaska or eastern Siberia. Of course I should have so stated in the work mentioned, but unfortunately neglected to do so.—ROBERT RIDGWAY, *Washington, D. C.*

A Black Robin and its Albinistic Tendencies.—In November last my attention was called to a caged Robin in this city that had suddenly turned black. I found the bird to be a lively, pugnacious and apparently healthy robin exhibiting a very complete case of melanism. Its plumage was jet black except for a few small, white under tail coverts, apparently two in number, and that when facing the light and viewed at a certain angle the breast feathers appeared to be terminally banded with blackish brown not distinguishable in other positions. The eye-ring was not noticeable, bill nearly black, anterior surfaces of tarsi and dorsi of toes heavily pigmented with blackish slate while the plantar surfaces of these were whitish flesh slightly interrupted by slate color.

The history of this bird, as given me by its owner and corroborated by a local physician who has known it for the last three and a half years, is

that it was taken as an abandoned nestling some four years previous and kept in a large cage hung in a kitchen and fed on a diet of ground hemp, grated carrot and cornmeal varied by an occasional small bit of apple, a minute quantity of scraped raw meat about once a week, and in spring time occasional meals of angle worms. Thirteen months ago last November the robin was moved from its original habitat to its present home where it hangs in a large wire cage suspended about five feet from the floor in front of a south window in a rather low kitchen. The room is not used for washing, and but little cooking is said to be done in it, and its temperature is said to be cool; but not unlikely it may be a little higher and more humid than normal.

Up to the latter part of last September, when its moult began, the robin had been in rather bright, normal coloration which at once gave place to the extreme melanistic phase that it had assumed about two weeks previous to my seeing it, November 6. Again, on January 28, I called to see the robin and found that the black pigmentation of the bill had almost entirely disappeared and that it was bright yellow except for a dusky spot near the tip of the culmen, a change that I was told had occurred within the preceding four days. The eye-rings were then conspicuous, appearing whitish at a distance but really greenish yellow. The tarsi and toes were decidedly lighter, the pigment of the former seeming to have formed ill-defined spots. About a week previous to this inspection white feathers were noticed by the owner in several parts of the plumage as the bird sat with erected feathers after bathing. I could see a number of these, imperfectly covered by the black ones, and a faint indication of fine white streaking, probably due to underlying white feathers, was seen on the breast. On February 10 I again viewed the robin and found the dusky spot on its culmen farther reduced, and there were then apparently three or four white under tail coverts. As the bird is lively and attempts always to face an observer it was impracticable to determine whether there was a farther increase in the underlying white feathers of the body and neck.

Coues¹ mentions a black robin turning white, and Barrows² mentions a robin "somewhat variegated with black and white, the black predominating above, though Mr. Leonard thinks the bird became ultimately almost white."

It appears that in the majority of black captive robins there has been a succeeding albinistic phase.

As melanism is due to an abnormal increase in black pigment or melanin it seems but natural to suppose that a more or less lengthy persistence of such a condition would produce an exhaustion of the supply and of the ability to renew it which would result in albinism more or less complete, depending on the degree of exhaustion. There is, I believe, little data to support such a theory and it would have to be obtained experimentally

¹ Coues, Elliott, Bull. Nutt. Ornith. Club, Vol. III, p. 48.

² Barrows, Walter B., Auk, Vol. II, p. 303.

much as Beebe¹ has obtained that indicating the probable inducing causes of melanism in caged birds subjected to slightly abnormal degrees of heat and humidity; a result in conformity with Faxon's² hint of over twenty years ago. — HENRY L. WARD, *Milwaukee, Wis.*

An Interesting Audubon Specimen.— It has long been known that many of Audubon's specimens were deposited in the Charleston Museum toward the close of 1850. Lack of space forbids going into details, so it must suffice to say that, while it is certain that these specimens were at one time in this Museum, we do not know just what species were represented and, until recently, had been unable to find any trace of Audubon's birds among our collections — which contain many very old specimens. Probably most of the records and perhaps most of the specimens were among material destroyed during the Civil War. Recently, however, while examining some old and damaged specimens which had been stored away for many years, I found a bird which is apparently an Audubon specimen. It bears two labels. The first, a piece of cardboard tied to the bird's leg, reads as follows:

"Loxia maculata Gmelin
Spotted Grosbeak — Pennant"

The second, consisting of a scrap of paper folded up and attached to the string of the other label, bears the inscription:

"Black Hills

Male

June 3 — 34

J. K. Townsend"

Mr. Witmer Stone has kindly examined both these labels and informs me that the second one is in Townsend's handwriting.

The specimen is in reality a representative of the Black-headed Grosbeak — *Zamelodia melanocephala* (Swainson). The assumption that it is an Audubon specimen is based on the following facts:— (1) that some of Audubon's birds were once in this Museum; (2) that Audubon received some of the Western birds from which he drew his figures from Townsend and that these birds of Townsend's were examined and figured by Audubon in Charleston in 1836 (see *Ornith. Biog.*, Vol. IV, *Introd.* pp. xii-xiv); (3) that this specimen was taken by Townsend on the same day, month, and year and in the same locality as the female Evening Grosbeak figured by Audubon and received by him from Townsend (see *Ornith. Biog.*, IV, p. 517).

In his 'Narrative of a Journey across the Rocky Mountains to the Columbia River . . . with a Scientific Appendix,' published in 1839, Townsend lists, among the birds collected, Mottled or Spotted Grosbeak, *Frin-*

¹ Beebe, C. William, *Zoologica*, Vol. 1, part 1.

² Faxon, Walter, *Auk*, Vol. III, p. 284. Other citations of black robins: Ruthven Deane, *B. N. O. C.*, Vol. I, p. 24; Barrows, *Auk*, Vol. 1, p. 90.

gilla maculata. This is the name used by Audubon in the 'Elephant Folio.' Since there can be little doubt that Audubon's figure of the male Black-headed Grosbeak was drawn from the specimen in this Museum, it is evident that the name *Fringilla maculata* was not, as supposed hitherto, a new one originating with Audubon. Furthermore, this name should certainly be considered a synonym of *Zamelodia melanocephala* Swainson, although Mr. Ridgway, in his 'Birds of North and Middle America,' does not include it as such.

Townsend seems to have confused the Black-headed Grosbeak with the Spotted Grosbeak — *Loxia maculata* of Gmelin, and out of this confusion arose the specific name *maculata* applied by Townsend and Audubon to the Black-headed Grosbeak. I am informed by Mr. Stone that the identity of *Loxia maculata* has never been determined and that it remains an unidentifiable (and probably merely hypothetical) species.—HERBERT RAVENEL SASS, *The Charleston Museum, Charleston, S. C.*

Three Erroneous Georgia Records.—COWBIRD (*Molothrus ater*).—In Mr. Ridgway's 'Birds of North and Middle America,' Part II, p. 208, the breeding range of this species is given as "south to Georgia (Wayne and McIntosh counties)." In the citations, however, no authority is mentioned for this breeding record. During the month of May, 1891, I was making observations on the birds of Wayne, McIntosh and Glynn counties but failed to detect the Cowbird.

This species does not breed on any portion of the South Carolina coast, and, if the birds really breed on the coast of Georgia (which is questionable), the breeding range would undoubtedly extend northward along the coast to South Carolina, as the Cowbird breeds far north. This Georgia record requires confirmation.

BANK SWALLOW (*Riparia riparia*).—Although the Bank Swallow is said by Mr. H. B. Bailey (Bull. Nutt. Orn. Club, Vol. VIII, 1883, p. 39) to breed on St. Simon's Island, he doubtless mistook migrating birds for breeding ones, as the Rough-winged Swallow (*Stelgidopteryx serripennis*) was the species I found breeding in May, 1891.

SHORT-BILLED MARSH WREN (*Cistothorus stellaris*).—Mr. H. B. Bailey, in Bull. Nutt. Orn. Club, Vol. VIII, 1883, p. 38, refers to this wren as breeding on St. Simon's Island. This statement is erroneous, as the Short-billed Marsh Wren does not breed in any portion of the South Atlantic States, the birds being simply autumnal, winter and late spring residents.

While Mr. Ridgway does not give the range (breeding and winter) in his great work (Birds of North and Middle America, Part III, p. 483), the so-called "breeding" record by Mr. Bailey is perpetuated in the citations. Since 1884 I have known that the birds are simply winter and late spring residents, and that their breeding range was far to the northward of the South Atlantic States. Mr. Ridgway's inclusion of Mr. Bailey's

unquestionably erroneous record was doubtless due to an oversight on his (Ridgway's) part, for he must have surely known that the species in question does not breed in the South Atlantic States.—ARTHUR T. WAYNE, Mount Pleasant, S. C.

Notes on Three Michigan Birds.—At the suggestion of Prof. W. B. Barrows, of the Michigan Agricultural College, I send a few notes gathered during the past summer. They are the result of a canoe trip down the Grand River, taken by a Mr. H. A. Moorman and myself. Although no remarkable finds were made, we succeeded in extending the supposed breeding range of two species, and in securing specimens of another rather uncommon resident.

At a point a few miles north of Jackson, Mich., we entered a remarkably large breeding area of the Prothonotary Warbler (*Protonotaria citrea*). The tract of low, water-covered land in which these birds were found extended, uninterrupted, for twenty-five miles on the river's course. Here this warbler was the most common bird encountered and, even after leaving this area, Prothonotary Warblers were met in several instances—our northernmost record being a few miles south of Lansing, Mich. The former breeding localities of this bird in our State were restricted to streams along the southern State line.

On July 7 a male Mourning Warbler (*Geothlypis philadelphia*) was taken at East Lansing. This bird, which was in full song and mating plumage, frequented the dense undergrowth in a tract of woods admirably adapted to its habits and, although no nest was found, I am fully convinced, from the date of capture and general surroundings, that it was a breeder there. Cadillac, in the northern part of the Southern Peninsula, was the former southern record for this bird.

The securing of three specimens of Henslow's Sparrow (*Coturniculus henslowi*), and the seeing of more in a low meadow near Eaton Rapids, help to establish more firmly the records in this State of a rather erratic and uncommon breeder.—EDWIN R. KALMBACH, Asst. Director K. S. Museum, Grand Rapids, Mich.

Corrections to 'A List of the Land Birds of Southeastern Michigan.'—In the 'Bulletin of the Michigan Ornithological Club' (beginning in Vol. IV, p. 14 and concluding in Vol. V, p. 43) was published 'A List of the Land Birds of Southeastern Michigan.' This contained a number of minor errors. The compiler's attention was directed to these several years ago but nothing has been done in the way of correction, so I have decided to take up the matter in the interest of exactness.

BALD EAGLE.—"A pair have been for many years on Elba Island. This should read Grosse Isle instead of Elba Island.

AMERICAN LONG-EARED OWL.—"J. Claire Wood has taken several sets." I have taken but one set in Michigan; a set of five eggs April 17, 1886.

NORTHERN RAVEN.—"J. Claire Wood saw a pair in 1885." This pair was noted near Windsor, Ontario, Canada, late in February, 1887. I have not seen the Raven in this part of Michigan nor do I know of anyone who has during my time, so it is doubtless of rare occurrence on the Canadian side of the Detroit River and I give a more detailed account for the benefit of Ontario compilers. The identification is beyond question. I was a short distance beyond the limits of Windsor, on the main road leading back from the river, when a sound reached my ears different from anything previously heard. It suggested the honking of wild geese or herons, but one glance at the birds and I knew they were ravens. They were directly over Windsor and circling like Buteos, but gradually working away from the river and toward me. They passed within a hundred yards, and number one dropped to the ground and began feeding while number two passed on to a tree top where it remained until number one took wing and, passing it, settled on a tree top some distance ahead. Number two then flew to the ground and fed awhile. Thus, alternately feeding and doing sentinel duty, they finally disappeared to the south. They were silent while feeding and perched on trees but frequently uttered their loud characteristic croaking sound while in flight, especially while circling.

RUSTY BLACKBIRD.—"J. Claire Wood shot one bird January 25, 1891, near the River Rouge, which is the only winter record." This is correct as to a specimen secured but the birds wintered here that year and have done so a number of times since.

BLACK AND WHITE WARBLER.—"J. Claire Wood has found several nests at Grosse Pointe Farms." This should be Gratiot Township. There is no place on the above farms where this warbler would breed.

YELLOW-BREASTED CHAT.—"A. W. Davidson found a pair breeding May 29, 1898. The bird was not secured." The male was taken by Mr. E. Mummery.

GRAY-CHEEKED THRUSH.—"First taken here in 1898 by J. Claire Wood." The first specimen was secured here September 19, 1891, by Walter C. Wood. I prepared the skin. The compiler has claimed I did not know what the bird was until 1905 but this bird, properly named, was sent to Joseph Grinnell four years before the list under consideration was published.

NORTHERN PILEATED WOODPECKER.—"J. Claire Wood saw one about 1886." This bird was seen in Grosse Pointe Township, Wayne County, October 15, 1888.

My attention was recently called to a doubtful record of my own in 'The Auk' (XVII, p. 391), which reads as follows: "In June, 1899, my brother added the Black-throated Blue Warbler to the list of birds breeding here. I have never personally observed this species in summer." The facts are that my brother reported a pair in an opening in a large woods. The female exhibited all the anxiety of a breeding bird and a search was rewarded by an empty nest, apparently just built. I accompanied him to this woods the following Sunday but there were so many

openings of similar appearance he failed to locate the one desired. No warblers of this species were seen. At various times during the last seven years I have thoroughly explored this woods in summer without seeing a Black-throated Blue Warbler, and now believe my brother was mistaken; in fact, he admits the possibility. The females of this species and the Indigo Bunting are very similar in coloration and the latter are common about the openings in this woods. The record should be eliminated.—J. CLAIRE WOOD, *Detroit, Mich.*

Some Rare Summer Residents of Berks County, Pennsylvania.—All the following species have been observed by the writer, during the summer months, although nothing definite has thus far been learned about the breeding habits of a few of them.

Philohela minor. AMERICAN WOODCOCK.—This much-esteemed game bird, which, according to good authority, was a rather frequent summer resident years ago, is now a very rare breeder here. Although the writer has never been fortunate enough to find a nest containing eggs, young, in different stages of development, have on several occasions been found, which is sufficient evidence of its breeding in this locality. On May 18, 1907, the writer and a friend found four nearly full-grown young with the parent birds in a dense thicket about one mile southwest of Fleetwood, while another friend reported having seen young, in a different locality, on May 19.

Cathartes aura. TURKEY VULTURE.—The writer's first experience with the breeding habits of this species was acquired on May 15, 1904, when a nest, containing two eggs, was found near Pikeville. The eggs were laid on the bare ground under a large rock about four feet from the entrance. While on a botanical tramp in the Blue Mountains on May 5, 1907, a second nest, containing two eggs, was found on what is popularly known as "Pulpit Rock," a peak in the mountains. These eggs were deposited on dry leaves in an opening under a huge mass of solid rock. According to a resident of that locality, several pairs are yearly to be found nesting there.

Buteo platypterus. BROAD-WINGED HAWK.—The first authentic nest of this hawk, found in this locality, was discovered by a friend on May 8, 1902. It was placed on a chestnut tree about 30 feet high. The nest was evidently an old crow's nest. Subsequently a nest was found on May 25, 1903, and two on May 19, 1907, in different localities. All these nests were placed on chestnut trees ranging in height from 25 to 30 feet, and in every case two eggs were deposited and the crows were the architects of the nests. However, on May 26, 1907, a nest, containing three eggs, was found near Moselem.

Strix pratincta. BARN OWL.—A nest of this species was discovered by the writer on April 2, 1905, in the hollow trunk of a buttonwood tree about 38 feet high. The bottom of the nest was covered with meadow mice and moles in all stages of decomposition, and on these were depos-

ited two eggs. On April 11, the nest contained seven eggs, and both birds occupied the hollow. The birds left the nest when the tree was ascended about half the distance to the entrance. Judging from the existing conditions, the birds had occupied the place for many years, and a pair is rearing its young there every spring.

Empidonax virescens. GREEN-CRESTED FLYCATCHER.—A nest (in course of construction) of the Green-crested Flycatcher was found by the writer in a thicket, near Fleetwood, on June 9, 1906. On June 15 the nest was found deserted and nothing has since been learned of the breeding habits of these birds, although several pairs may be heard during the summer in the same locality.

Otocoris alpestris praticola. PRAIRIE HORNED LARK.—A pair of these birds was seen during the summer of 1906, and again on June 3, 1907, in the same locality. The species may probably prove a rare breeder here later on.

Zamelodia ludoviciana. ROSE-BREASTED GROSBEEK.—A nest of the Rose-breasted Grosbeak was found by the writer on May 28, 1905, near Fleetwood. It was placed on a small red maple about 6 feet high and contained 2 eggs and the broken remains of a third one. On June 9, 1906, a second nest, containing four about half full-grown young, was found in another locality, while on June 20 a third nest, containing three eggs, was found in the same locality. Several pairs are yearly nesting in this locality.

Helminthophila pinus. BLUE-WINGED WARBLER.—This warbler has repeatedly been seen in this locality during the summer months, but the writer has thus far not been able to learn anything about its breeding habits and would be very thankful to any reader of 'The Auk' who is familiar with these birds for any information that will better qualify him to find its treasures.

Wilsonia mitrata. HOODED WARBLER.—The first and only nest of this warbler that has ever been found in this locality, to the writer's knowledge, was discovered on June 6, 1907, in a dense thicket at the foot of the Blue Mountains. The nest was completed but contained no eggs. On visiting the same locality on June 15, the nest contained four eggs. It was placed about 18 inches from the ground and was saddled on a dead stick as well as having been partly supported by a small branch of sassafras.

Setophaga ruticilla. AMERICAN REDSTART.—The Redstart has on several occasions been observed in this county during the summer months, but its breeding habits remain to be studied by me.

Sitta canadensis. RED-BREASTED NUTHATCH.—A Red-breasted Nuthatch was seen by the writer on a steep hillside in the Blue Mountains on June 6, 1907. It is probable that the species is a rare breeder in the mountainous portion of this county.—W. H. LEIBELSPERGER, *Fleetwood, Pa.*

Rare New England Birds.—The Boston Society of Natural History has recently acquired for its New England collection, several rare or interest-

ing birds, which with the permission of the Curator, Mr. C. W. Johnson, are here recorded. These include certain species of shore birds collected by the late William Everett, of Boston, about 25 years ago, mostly at Ipswich, Mass., but a few at Nantasket, Mass., though the exact data are not recorded. These specimens were presented, at his request, shortly after his death.

Gelochelidon nilotica. GULL-BILLED TERN.—A specimen taken in March, 1885, near Portland, Maine, was purchased from Ward of Rochester.

Chaulelasmus streperus. GADWALL.—A specimen was taken December 1, 1902, at Point Judith, R. I.

Aythya collaris. RING-NECKED DUCK.—Mr. Dwight Blaney presented a female taken at Eastham, Mass., October 28, 1903.

Herodias egretta. AMERICAN EGRET.—A female taken at East Greenwich, R. I., August 16, 1904, was purchased from Messrs. Angell and Cash.

Rallus elegans. KING RAIL.—A bird, in worn plumage, was captured in a steel trap at Peabody, Mass., on March 13, 1908.

Ionornis martinica. PURPLE GALLINULE.—A male captured at Seacomet, R. I., on June 8, 1900, is in the collection.

Steganopus tricolor. WILSON'S PHALAROPE.—A specimen in fine plumage taken on the Massachusetts coast was received from the collection of the late William Everett. This seems to be the fifth recorded specimen for the State.

Actodromas bairdii. BAIRD'S SANDPIPER.—A male taken at Newburyport, Mass., September 6, 1906, was presented by Mr. John H. Hardy, Jr.

Limosa fedoa. MARBLED GODWIT.—A fine old female is in the Everett collection, from the Massachusetts coast.

Symphemia semipalmata. EASTERN WILLET.—A specimen from the Massachusetts coast was received from the Everett collection.

Tryngites subruficollis. BUFF-BREASTED SANDPIPER.—One specimen from the Massachusetts coast was received from the Everett collection.

Numenius longirostris. LONG-BILLED CURLEW.—A specimen from the Massachusetts coast was received from the Everett collection.

Oxyechus vociferus. KILLDEER.—A specimen from the Massachusetts coast was received from the Everett collection.

Zenaidura macroura. MOURNING DOVE.—A specimen was taken at Barnstable, Mass., on December 6, 1903.

Falco rusticolus obsoletus. BLACK GYRFALCON.—One was recently purchased that was taken at Alton, Penobscot Co., Maine, on October 20, 1905. This is a very dark bird, almost entirely black, and with almost no light edging to the feathers of the breast; the under tail coverts are barred with white.

Strix pratincola. BARN OWL.—On August 17, 1907, a young man while hunting at Dedham Island, Dedham, Mass., started a Barn Owl from among some bushes on the edge of a meadow. He shot the bird and it proved to be a male. The Society has purchased it for the New England collection.

Scotiaptex nebulosa. GREAT GRAY OWL.—A specimen was obtained that was shot at Stockton Springs, Maine, in January, a few years since.

Cryptoglaux tengmalmi richardsoni. RICHARDSON'S OWL.—One was obtained from Milford, Maine, where it was shot on December 22, 1906.

Surnia ulula caparoch. AMERICAN HAWK OWL.—One was taken at Van Buren, Aroostook Co., Maine, on April 16, 1906.

Piranga rubra. SUMMER TANAGER.—A male, said to have been shot at Seaconnet, R. I., on April 27, 1901, was purchased of Messrs. Angell and Cash. There seems to be no reason to discredit the record.—GLOVER M. ALLEN, Cambridge, Mass.

Notes from West Virginia.—**Sphyrapicus varius.**—On July 3 and 4, 1899, I found a number of Yellow-bellied Sapsuckers in "The Pines," a black spruce region near Pickens, in the western part of Randolph County, West Virginia. The next day, July 5, great numbers of these birds were found among the dead and dying sugar maples on the top of Turkey Bone Mountain, not far from "The Pines." While in the Yew Mountains, in Nicholas County, I took a young male of this species on August 17, 1904.

Empidonax minimus.—In many of the higher portions of West Virginia there are extensive glades. These mountain swamps, with their tall cinnamon ferns, cranberries, and other characteristic plants, are found at altitudes varying from 3000 to 4000 feet. There are many such glady regions in Webster County. While collecting a few specimens in one of these Webster County glades, on the 2d day of July, 1907, I took a fine adult male Least Flycatcher. It was in the very heart of a great thicket of glade shrubbery, and had been heard there for several days before it was taken. Judging from the actions of the bird, and the greatly enlarged testes, it may have been nesting there. Others of this species were heard near the same place in the early days of July.

Otocoris alpestris praticola.—Among my notes I find the following account of the breeding of this species in Pittsburgh, Pa. "Schenley Park, Apr. 4, 1898. On above date an adult *Otocoris alpestris praticola* was observed feeding its young out near the golf links. The young bird was captured and identified, and then released. Afterwards the parent bird brought food again. Nasal tufts incipient in young bird. Hind claw already very long. Down still on head on either side where tufts of adults are. Queer horned appearance. Young hopped,—did not walk. Plumage in spotted phase. Young bird almost able to fly. Adults wary. Did not pay any attention to squeaking sound made on back of hand. Note of young like the peculiar piping note of adult. Only one young bird observed."

This southern breeding record of the Prairie Horned Lark led me to study the bird rather closely in succeeding years in West Virginia. I have observed this species in many sections of the State. In Kanawha County, at Charleston, a bird of this species was seen as late as June 19, 1902. In Wood County it seems to be resident throughout the year. At Poca Bottoms, in Putnam County, a specimen was taken on October 15, 1902,

by A. Sidney Morgan, and was carefully examined by the writer. Two were observed at Cameron, Marshall County, June 11, 1900 — evidently a pair. I have seen birds of this species in Lewis County in the breeding season. Prof. S. B. Brown, of the West Virginia University, tells me that he has seen this bird a number of times near Morgantown, and on April 2, 1905, Prof. Fred E. Brooks, Associate Entomologist of the West Virginia Agricultural Experiment Station, took a young bird just from the nest near Morgantown. To all of these records, I may add the following, which is, I believe, the most southern record of the breeding of this species. I give these notes as they came to me in a letter from Prof. Fred E. Brooks, as follows:

"French Creek, W. Va., Apr. 11, 1905 . . . Your note concerning my observation on the Horned Lark at Morgantown came here yesterday, and seems to have stirred me up, for this morning I found a nest with three young birds. Father was scattering some manure on the grass just over the hill from the corn-house, and the chickens, which were gathered about him, were attacked by two old larks. They would alight upon their backs and fight them viciously. He called to me, and after looking a minute I found the nest only a few feet away. The nest is without the slightest protection, and is made almost entirely of grass-blades and straws in a little hollow place in the ground no larger than a pint cup. The young birds will be large enough to leave the nest in five or six days. They have the white spots all over the body which you mention as being characteristic. The young one I caught at Morgantown had the same spots."

Within ten years this species seems to have extended its breeding range far southward into West Virginia.

Carpodacus purpureus.— On August 28, 1902, I found the Purple Finch abundant in "The Pines." While sitting by the road-side, a pair of these pretty birds came down to a spring and drank. One of these was a male in full "purple" plumage. These finches were flying everywhere among the black spruce trees and over the adjoining farms.

Chondestes grammacus.— About the year 1900, the Lark Sparrow first made its appearance at French Creek, in central West Virginia. Early in June of that year my attention was called to this bird by its splendid song and striking appearance. On June 20, I saw an adult Lark Sparrow with two young just a day or two from the nest. Again on July 1, two young were seen. For three or four years afterward, this species was often seen at French Creek in the breeding season, but I did not succeed in finding a nest, or in seeing the young again. I have additional records of the occurrence of this species in this State as follows:— Blue Knob, Clay County, July 30, 1900; Waverly, Wood County, almost every week in summer seasons, 1903-1906; Lewis County, one heard in song May 2, 1907. This species, like the Prairie Horned Lark, seems to be a recent emigrant into our State.

Junco hyemalis carolinensis.— For the past ten years, I have spent a week or more each summer in some part of the mountainous region of this

State. Several trips have been made into the Rich Mountains, near Pickens in Randolph County. In 1904 I was in the Yew Mountains in Webster and Nicholas Counties. In 1906 I spent several days in the Back Alleghenies, in Randolph and Pocahontas Counties. Other short trips have been made into the "Spruce Belt" and other high sections of West Virginia. While in these higher regions I have had good opportunities to study the Carolina Junco and other species found in the Canadian Life Zone. Juncos were very abundant in "The Pines," on top of Rich Mountain, in July, 1899. At this time I found many old nests in the up-turned roots of spruce trees that had blown over in recent storms. In the Yew Mountains, in August, 1904, this subspecies was found in great numbers. Several specimens taken seemed to have all the marks of *carolinensis*, while others were quite typical *hyemalis*. Specimens from the Yew Mountains were slightly smaller in all their measurements, excepting length of tarsus, than specimens from the Back Alleghenies. On August 11 a nest was found in process of construction in an old up-turned root near Hunter's Fork of Cherry River. Six days later, the nest was seen again and contained three eggs. On August 15, somewhat nearer the summit of one of the higher points in the Yew Mountains, another nest was found in the top of a small black spruce about 3½ feet from the ground. The nest was made of moss and lined with rootlets and long hairs. It contained three fresh eggs.

The Carolina Junco is very abundant in the Back Alleghenies where I collected a number of specimens in August, 1906. The birds in this region were much nearer true *carolinensis* than those found in the mountains farther to the west. No nests were found in the Back Alleghenies.

Vireo solitarius alticola.—A young female of this subspecies was taken for me on August 15, 1904, in the Yew Mountains at an altitude of 4000 feet. Two birds were seen in a large birch tree uttering a low, scolding note. This seemed much lower and softer than the similar *kree* of the Blue-headed Vireo. On August 7 and 8, 1907, many Solitary Vireos were heard and seen in the Rich Mountains. No specimens were taken, but I am inclined to believe they were *alticola*.

Dendroica caerulescens cairnsi.—Every time I have gone into our West Virginia mountains, I have found these birds in abundance. On July 4, 1899, I saw an old male feeding a young bird up in the dark spruce forests above Pickens. As late as August 17, 1906, the young birds were following the old ones, and receiving their food from them, up in the Back Alleghenies. Many of these West Virginia birds which I have seen have no black on the back.

Dendroica maculosa.—In 1904, I spent a week in the Yew Mountains (August 10–17), and during our stay there not a single Magnolia Warbler was seen. In the Rich Mountains, however, I have observed this species very often. On July 4, 1899, I saw a young bird following two adults.

So late in the season as August 18, in 1906, while out in the black spruce woods near Cheat Bridge, I saw an adult Magnolia Warbler feeding her

young that had just left the nest. On the same day a young bird of this species was taken for me by Prof. W. E. Rumsey.

On a long mountain ridge that lies between Big Sugar Creek and Little Sugar Creek, at the head-waters of Elk River, I found the Magnolia Warbler to be one of the most abundant species on the 14th of August, 1899.

Dendroica cerulea.—Wonderfully abundant in Wood County on the hills just back from the Ohio River. Breeds in the open oak woods on top of the hills.

Dendroica pensylvanica.—A nest of the Chestnut-sided Warbler was found in the glades of Webster County on July 2, 1907. It was neatly placed in the top of a clammy azalea, about 8 feet from the ground. The azalea was in full bloom. There were two young birds in the nest. Many other birds were seen, and all were evidently nesting.—EARLE A. BROOKS, *Weston, West Virginia.*

RECENT LITERATURE.

Rothschild's 'Extinct Birds.'¹—Mr. Rothschild, as is well known, has been for years actively interested in the subject of vanishing birds, and we expected to find in the present expensive work a complete and final account of the species now known to be extinct, but in this we are disappointed. As stated on the title page, this is "an attempt to unite in one volume a short account of those birds which have become extinct in historical times—that is, within the last six or seven hundred years," which means that the author has included in his work the numerous fossil birds of the New Zealand and Mascarene regions. As a matter of fact, the accounts of fossil birds (*i. e.*, those known only from their osseous remains), overbalance those of the recently extinct ones, since some 90 of the former are treated, compared with 76 of the latter, while over 50 pages of the book are perfectly blank.

Of the fossil birds we shall have little to say here. It may be mentioned, however, that colored figures are given of *Megalapteryx huttoni* and *Dinornis ingens*, representing them as they are supposed to have existed in life. If correctly delineated, the *Megalapteryx* must have been a very extra-

¹ Extinct Birds. | An attempt to unite in one volume a short account of | those Birds which have become extinct in historical | times—that is, within the last six or seven | hundred years. To which are | added a few which still | exist, but are on | the verge of | extinction. | By | The Hon. Walter Rothschild, | Ph. D., F. Z. S. | With 45 coloured Plates, embracing 63 subjects, and | other illustrations. | London, | Hutchinson & Co., Paternoster Row, E. C. | 1907—Small folio, pp. i-xxix + 1-244, 45 colored plates, and 4 plates of outlines.

ordinary creature, since it is supposed to have possessed a 'booted' tarsus, a feature we believe to be unique (not to say unnatural) among flightless birds, whose tarsi are covered with a strong armor of scales. The feathered tarsus is not an innovation of the artist's, for as Mr. Rothschild says, "Professor Owen has shown that *Megalapteryx huttoni* was feathered down to the toes, and in the plate I have represented it clothed with feathers" (p. 186). The nomenclature of fossil forms is up to date, and the author evidently has been to much pains in revising the various genera and species of Dinornithidae. We note that *Cela* Reichenbach, is recognized as a genus containing five species, but would call attention to the earlier use of this name by Oken (1816).

Mr. Rothschild's book will serve to call attention to the many birds already extinct, and to the still larger number now threatened with extinction, although the list there given by no means includes all of the species in these categories. We find no mention of the Eskimo Curlew, the 'Cahow' of Bermuda, the several Guadalupe Island birds now extinct or nearly so; nor do we find many of the Polynesian species that might well be included among those threatened with extinction.

Among the colored plates are 20 or more, based entirely upon descriptions (no specimens having been preserved) or illustrations of the old writers, and some of these do not appear to be entirely trustworthy. Thus, in the plate of *Ara erythrura*, we find the tail prominently tipped with blue, while in the text it is described as "entirely red." It is not improbable, too, that some of the Macaws ascribed to the West Indies, such as *Anodorhynchus purpurascens*, were originally described from cage birds brought from the continent. The plate of *Ara tricolor*, based on the Liverpool Museum example, if a faithful reproduction of that specimen, may prove to be some other species (it is to be remembered that we know nothing of the colors of the species which formerly lived in Hayti), since it lacks the strong yellow color on the back of the neck, as well as the yellow markings on the sides of the body, and yellow edgings to the red feathers on the mantle. In the account of this species the author enumerates five specimens known to him, "two in the British Museum, one in Paris, one in Leyden, one in Liverpool." To this list we can easily add six more: two in Washington, one in Boston, and three in Cuba, while Gundlach probably sent others to Germany. Had the author addressed inquiries to the various museums at home and abroad, his census of specimens in this and many other species would have been more nearly complete.

Notornis alba of White (or Shaw), is accredited to Norfolk Island, while *N. stanleyi* is given as the species from Lord Howe's Island, but it seems probable that *N. alba* is the one from the last-named locality. White's account (not given by Rothschild) is as follows: "They also found on it [Lord Howe's Island, at that time newly discovered] in great plenty, a kind of fowl, resembling much the Guinea fowl in shape and size, but widely different in colour; they being in general all white, with a red fleshy substance rising like a cock's comb, from the head, and not unlike a piece of

sealing-wax. These not being birds of flight, nor in the least wild, the sailors availing themselves of their gentleness and inability to take wing from their pursuits, easily struck them down with sticks." (White, Journ. Voy. N. S. W., 1790, p. 135). In our estimation, a reproduction of the old accounts of many of these extinct birds would have greatly enhanced the value and usefulness of the book.

Strigiceps leucopogon Lesson, is introduced on page 30, but its identification is still uncertain. The type was probably in the collection of Dr. Abeillé, of Bordeaux, but in any event, if one could only consult the collection of colored drawings at one time in Lesson's possession (cf. P. Z. S., 1855, 212), its determination would probably be quite simple.¹

The following species are described and named as new: *Casuarium lydekkeri* (p. x), *Ara erythrura* (p. 54), *Necropsittacus* (?) *borbonicus* (p. 62), *Bubo* (?) *leguati* (p. 71), *Strix newtoni* (p. 79), *Ardea duboisi* (p. 114), *Nesænas duboisi* (p. 166), *Megalapteryx hamiltoni* (p. 197), *Emeus boothi* (p. 210), *E. haasti* (p. 210), *E. parkeri* (p. 211), and *Dromaius peroni* (p. 235), the last being a new name for the Kangaroo Island Emu, currently known under Vieillot's specific name *ater*, but, as Mr. Rothschild here shows, the latter was originally proposed by Vieillot to replace Latham's *Casuarium novæ hollandiæ*. Several nominal species proposed by Forbes are here first given a definite status, viz.: *Palæocasuarium* (p. 219), *P. haasti* (p. 220), *P. velox* (p. 220), and *P. elegans* (p. 220). "*Foudia newtoni*," mentioned on p. xi, seems to be a new name for *F. flavicans*, but if so, is a *nomen nudum*.—C. W. R.

Dearborn on a Collection of Guatemalan Birds.²—The birds recorded in this catalogue were collected between the winter of 1904 and the early part of 1906, a small proportion by Messrs. Edmund Heller and C. M. Barber, but the greater part of them, no less than 1000, by the author of the paper, during the latter part of the period. In all, 1187 specimens, mostly skins, constitute the collection, and these represent the large number of 305 species and subspecies.

The identifications have apparently been made with care and there are many interesting notes on geographical and other variations. Three new forms are described,—*Saucerottea cyanura guatemala*, *Diglossa montana* and *Regulus satrapa clarus*, and the range of *Terenotriccus erythrurus fulvigula* is extended considerably northward. A remarkable female Rose-

¹ Abeillé's collection was an important one, containing about 1500 specimens, including nearly one hundred of Lesson's types (described chiefly in the 'Écho du Monde Savant'). It was probably sold, after Abeillé's death, since a little pamphlet ('Catalogue des Oiseaux composant la Collection de feu le Dr. Abeillé, de Bordeaux,' 44 pp.) was published in 1850, giving a list of the specimens in it. On p. 15, we find Abeillé had one specimen of *Strigiceps leucopogon*. Here the locality is stated to be "Himalaya."

² Catalogue of a Collection of Birds from Guatemala. By Ned Dearborn, Assistant Curator of Ornithology. Field Museum of Natural History, Publication 125. Ornithological Series, Vol. I, No. 3, pp. 69-138, pll. i-iii (maps). November, 1907.

breasted Grosbeak is described as having its under wing coverts and a suffusion on its throat geranium pink, otherwise normal in plumage.

The nomenclature of the latest authorities, such as Ridgway, Sharpe and the A. O. U. Committee, is used and the many changes recently shown to be necessary are adopted. Unfortunately, however, seven or eight slight errors, such as misspellings and wrong gender endings, have crept in.

A map giving the points at which collections were made serves as the frontispiece. Two other maps show the ranges of the races of *Calocitta formosa* and *Planesticus tristis*, and a half-tone illustrates the breast and trachea of the male *Ortalis vetula plumbeiceps*.

The value of the list is enhanced by many careful notes by the author on the coloring of the changeable portions of the birds collected, such as iris, bill, feet and naked skin. There are also frequent remarks on moult and on the habits of the birds observed.

Mr. Dearborn's paper is a painstaking piece of work and adds much of interest and value to our knowledge of Guatemalan birds.—W. De W. M.

Shaw's 'The China or Denny Pheasant in Oregon.'¹—The Chinese or Denny Pheasant (*Phasianus torquatus*) was introduced into Oregon by the late Judge O. N. Denny, at one time Consul-General to Shanghai, "after whom the legislature of Oregon has since called the bird the Denny Pheasant." The story of its successful introduction and subsequent increase and dispersion is here told in considerable detail, but, strangely, exact dates are omitted. From the context, its introduction was apparently made in the early '80's. The first shipment was unsuccessful, few of the seventy birds in the consignment reaching their destination alive, and these soon died from injuries received in transit. The following year a shipment of thirty birds was made, all but four of which reached Portland alive and in good health, and a few days later were turned out on the large ranch of Judge Denny's brother, John Denny, in Linn County, in the Willamette Valley. "About two years later," Judge Denny made another shipment of ninety birds, "chiefly pheasants and partridges... in which the ring-necked was not a predominating factor." Those now sent were largely "silver and copper pheasants," which were transferred to a club and turned loose on Protection Island, in the Columbia River, and "many flocks of silver pheasants now west of the Cascades trace their ancestry to this island in the Columbia."

This account, less explicit as to dates than is desirable, is followed by an informal notice of the native grouse of the Northwest, and of the habits

¹ The China or Denny Pheasant in Oregon | with notes on the | Native Grouse of the Pacific Northwest | Written and illustrated | by | William T. Shaw, B. Agr., M. S. | Assistant Professor of Zoology and Curator of the Museum, State College of Washington | [seal] Philadelphia & London | J. B. Lippincott Company | 1908 — Oblong, 6½ × 9½, pp. 24, pll. 14, and colored frontispiece; text and plates on heavy plate paper. Price, \$1.50.

of the introduced Ring-necked Pheasant, in which it is stated that hybrids between this species and the Sooty Grouse are of frequent occurrence. An attempt to domesticate the pheasants, it is said, has met with an encouraging degree of success.

The illustrations of this beautifully printed brochure include a colored plate of the male 'China Pheasant,' and the following half-tone plates: Peterson's Butte, where the pheasants were first liberated; a female 'China Pheasant'; its nest, full of eggs, and the same nest, with the egg shells after hatching; pheasant chicks; a view in the Willamette Valley, the home of the pheasants; a male Sooty Grouse; a hybrid — 'China Pheasant' + Sooty Grouse; then, on succeeding plates, a Willow Grouse, a Sage Grouse (male), Columbia Sharp-tailed Grouse (female), Oregon Ruffed Grouse, Mountain Partridge, and Valley Partridge. All are from mounted birds but from excellent specimens, and with good back-ground effects.— J. A. A.

Giglioli's 'Avifauna Italica.'— As indicated by the full title,¹ this volume of more than 800 pages is a catalogue of the birds known to occur in Italy, numbering 496 species, with their local vernacular names, a statement of their manner of occurrence and distribution in Italy, and a critical examination of their local variations. Italian birds appear to possess an unrivalled number of vernacular designations, the enumeration of which, for the commoner species, forms a large part of the text of the present work.² There is no technical synonymy, and the species are not described; the extended annotations relate wholly to their distribution and manner of occurrence, with mention of their various subspecies, as recognized by modern authors, and in general their condemnation as puerile innovations. In other matters of nomenclature the author is also extremely conservative; tautonymic designations and trinomials are to him an abomination. His nomenclature is strictly binomial, and the forms recognized by him are all full species. He has, indeed, only unsympathetic words for these modern innovations (see especially pp. xiii–xviii of the Introduction, and elsewhere *passim*).— J. A. A.

¹ Ministero di Agricoltura, Industria e Commercio | — | Direzione generale dell' Agricoltura | — | Ufficio Ornitologico | — | Secondo Resoconto | dei risultati della inchiesta ornitologica in Italia | — | Avifauna Italica | nuovo elenco sistematico delle specie di uccelli | stazionarie, di passaggio o di accidentale comparsa in Italia; | coi nomi volgari, colla loro distribuzione geografica, | con notizie intorno alla loro biologia, ed un esame critico delle variazioni | e delli cosiddette sottospecie | compilato dal dottore | Enrico Hillyer Giglioli | Professore ordinario di Zoologia e Anatomia dei Vertebrati | nel R. Istituto di Studi Superiori in Firenze, Membro del Comitato ornitologico internazionale | e Direttore dell' Ufficio ornitologico | [Seal] Firenze | Col Tipi dello Stab. Tipografico S. Guiseppe | 1907 — 8vo, pp. XXIV + 784. Lire 10.

² The Index to the vernacular names occupies 70 pages of small type, of three columns to the page!

Bonhote's 'Birds of Britain.'¹—This book gives colored illustrations of 108 species of British birds, forming 100 plates, reproduced, generally satisfactorily, from Mr. Keuleman's originals, selected for this work by H. E. Dresser from the illustrations of his well-known 'Birds of Europe.' The author tells us that the work includes "every species which has been known to occur in Great Britain, with a description of their leading characteristics and true habitat . . . ; and the plates have been carefully selected so as to give examples of the most typical species." The "notes on their ways and habits," we are also informed, have "been taken at first hand straight from Nature." The biographies are for the most part pleasantly written, and though generally short, serve, with the colored plates, to make an attractive book for the general reader interested in British birds.—J. A. A.

'British Birds.'²—'British Birds'² is the name of a new illustrated monthly magazine devoted entirely to the study of the birds of the British Isles. The first number bears date June 1, 1907, and it has already shown abundant *raison d'être*. It is edited by H. F. Witherby, assisted by W. P. Pycraft, and evidently has the earnest support of many of the leading British ornithologists. "It shall be one of our chief aims," say the editors, "but not by any means our only aim, to provide in these pages, month by month, a current history of British birds. Much will come, we trust, by first-hand contributions, but we shall also glean, from every published source available, whatever is likely to prove of permanent value . . . Besides reviews and notices of books dealing with British birds, we intend to publish each month a list as complete as possible of all the books on the subject which have appeared during the month."

The opening article of the first number is a paper by the late Howard Saunders on 'Additions to the List of British Birds since 1899,' or since the appearance of the second edition of this author's 'Illustrated Manual of British Birds,' since which date "twenty additional species have established more or less claim to inclusion." The records are given in detail for each. "A Study of the Home Life of the Osprey," by P. H. Bahr, is based on the observations of a colony, in July, 1903, "on an island not a hundred miles from New York City," and is illustrated with several half-tone plates and text cuts. The first number also contains a paper by P. L. Selater 'On a supposed new British Tit of the genus *Parus*,' *P. atricristatus kleinschmidti* (Hellm.) Hartert, in which he suggests that further explanations are desirable respecting its real status. These are furnished

¹ Birds of Britain | By | J. Lewis Bonhote | M. A., F. L. S., F. Z. S. | Member of the British Ornithologists' Union | With | 100 Illustrations in Colour | selected by | H. E. Dresser | from his 'Birds of Europe' | [Monogram] London | Adam and Charles Black | 1907 — 8vo, pp. i-xii + 1-405, 100 col. pl. Price, 20s. (post free, 20/6).

² British Birds, an Illustrated Magazine devoted to the Birds on the British List. 326 High Holborn, London: Witherby & Co.—8vo, about 32 pp. to the number, with half-tone plates and text illustrations. Monthly. Price one shilling net.

by Dr. Hartert in a later number (No. 7, December, pp. 208-222) in a paper entitled 'On Birds represented in the British Isles by peculiar forms,' twenty-two in number, the history and the characters of each of which are presented.

There are also continued papers running through several numbers each, as 'Nesting Habits observed abroad of some Rare British Birds,' by F. C. Selous; 'On the More Important Additions to our Knowledge of British Birds since 1899,' by H. F. Witherby and N. F. Ticehurst; 'Nestling Birds and Some of the Problems they present,' by W. P. Pyecraft; 'Wind and Flight,' by F. W. Headley, etc. Each number contains also several pages of 'Notes,' and a number of reviews of new books and papers. There are also memoirs of Professor Alfred Newton, by Dr. Sharpe, and of Howard Saunders, by Abel Chapman, each with a portrait.

As shown by the foregoing, there was evidently a field for a magazine like 'British Birds,' and, furthermore, that the field is now excellently filled by this new Journal.—J. A. A.

Godman's Monograph of the Petrels.¹—Part I of this beautiful monograph treats of 24 species, of which 20 are figured, belonging to the genera *Procellaria*, *Halocyptena*, *Oceanodroma*, *Garodia*, *Pelagodroma*, *Pealea*, and *Cymodroma*. The synonymy and bibliographical references are followed by a Latin diagnosis, a fairly full biography, and by an account of the various plumages of the species. The subject seems to be brought well up to date, both as to the technical and biographical details.

It may be noted that *Oceanodroma socorroensis* Townsend, 1890, is referred to *O. monorhis* Swinhoe, 1867, and that *O. monorhis chapmani* Berlepsch, 1906, is not considered as separable from *O. monorhis* after an examination of the types, kindly submitted to the author of the 'Monograph' for study. On p. 9, *O. beldingi* is evidently a lapsus for *O. beali*.

This useful work is a most welcome and important contribution to the literature of these little-known birds. As we have already announced (*antea*, p. 105), the 'Monograph' is to be issued in five quarterly parts, and will contain over 100 hand-colored plates.—J. A. A.

Mathews's 'Handlist of the Birds of Australasia.'²—This is stated by the author to be preliminary to his proposed work 'The Coloured Figures

¹ A | Monograph | of the | Petrels | (order Tubinares) | By F. Du Cane Godman | D. C. L. F. R. S. President of the British | Ornithologists' Union etc, etc. | With hand-coloured Plates | by J. G. Keulemans | In Five Parts | Part I. | Witherby & Co. | 326 High Holborn London | December 1907.—Large roy. 4to, pp. 1-68, pls. 1-v, va, vi-xix. Subscription price, £2 5s. per part.

² Handlist | of the | Birds of Australia | By Gregory M. Mathews | F. L. S., F. Z. S., M. B. O. U., &c. | With an Introductory Letter | by R. Bowdler Sharpe, L.L. D. | Assistant Keeper, Department of Zoology, British Museum. | Melbourne: | Walker, May & Co., Printers, Mackillop Street | (off 390 Little Collins Street) | 1908.—Supplement to 'The Emu,' Vol. VII, January, 1908, pp. 1-108.

of the Birds of Australasia,' which is to be "a set of hand-coloured plates of the birds of Australasia, drawn by Mr. J. G. Keulemans." The 'Handlist' is founded upon Dr. Sharpe's 'Handlist of Birds,' and is put forth "to invoke criticism and coöperation of ornithologists, in order to enhance the value of the larger undertaking." The 'Handlist' will, however, be in itself a great convenience. It follows the arrangement and nomenclature of Sharpe's well-known 'Handlist,' and comprises 883 species, arranged in 345 genera.—J. A. A.

Marshall on the Anatomy of *Geococcyx*, *Bubo*, and *Aeronautes*.¹—Miss Marshall here follows her former paper on the anatomy of *Phalacroptilus* (see Auk, XXIII, 1906, p. 237) by a paper descriptive of the alimentary tract, the central nervous system, the nostrils and eye, the urogenital system, and the muscles of the fore limb, in *Geococcyx*, *Bubo*, and *Aeronautes*, and the pterylosis of *Geococcyx*, with illustrations.

The comparisons are limited mainly to the five genera here named. There appear to be no references to the previous literature of the subject, beyond a short list of titles, with the vaguest references to place of publication possible, as 'Ibis,' 'Auk,' 'Proc. Zool. Soc. London,' etc. (see *antea*, p. 92). As a contribution, however, to descriptive anatomy the paper has value, as it is very fully illustrated.—J. A. A.

Shufeldt on the Osteology of *Sarcops*.²—The skeleton of *Sarcops calvus* is here described and figured, and compared with that of several other genera, as *Oriolus*, various genera of Icteridæ, Corvidæ, etc., without, however, reaching a definite conclusion as to its nearest relationships.—J. A. A.

McAtee's 'Food Habits of the Grosbeaks'.³—The Grosbeaks here considered are the Cardinal, Gray (*Pyrrhula sinuata*), Rose-breasted, Black-headed, and Blue Grosbeaks. Each is illustrated in colors, from drawings by Fuertes, and numerous text figures illustrate their food, vegetable as well as insect. The account of the food habits of these five species is detailed and comprehensive, and is based on the careful study of the stomach contents of a large number of individuals. These birds attack crops to a slight extent, some of the species preferring fruit, others grain, but all are

¹ Studies on Avian Anatomy.—II. *Geococcyx*, *Bubo* and *Aeronautes*. Margaret E. Marshall, M. A. Contributions from the Zoological Laboratory of The University of Texas, No. 73. Trans. Texas Acad. of Science, Vol. IX, 1906, pp. 19-40, pll. i-vii.

² Osteological and other notes on *Sarcops calvus* of the Philippines. By R. W. Shufeldt. Philippine Journ. Sci., Vol. II, No. 5, Oct. 1907, pp. 257-267, with 1 plate.

³ Food Habits of the Grosbeaks. By W. L. McAtee, Assistant Biological Survey. Bureau of Biological Survey, Bulletin No. 32. Washington, Government Printing Office, 1908. 8vo, pp. 92, 4 pll. (3 colored), and 40 text fig.

large destroyers of weed seeds and noxious insects, some of them 'specializing' on some of the greatest insect pests, as the cucumber beetles, borers and curculios of various kinds, Colorado potato beetles, cotton boll weevil, cankerworm, army worm, and other destructive caterpillars, etc. The conclusion is reached that these birds are many times more beneficial than destructive, and are hence of great economic value.— J. A. A.

The Work of the Biological Survey.—The act making appropriation for the Department of Agriculture for the fiscal year ending June 30, 1908, directed the Secretary of Agriculture "to investigate and report to the next session of Congress to what extent, if any, the work now being done by the Bureau of Biological Survey is duplicated by any other Department of the Government, and to what extent the work of this Bureau is of practical value to the agricultural interests of the country." The Secretary's Report¹ forms a document of some forty pages, illustrated with appropriate maps, reviewing in detail the work of the Survey. He says: "I have the honor to report that no part of the work now being done by the Bureau of Biological Survey is duplicated by any other Department of the Government, and that the work of the Survey is of great practical value to the agricultural interests of the country." Following this statement is a concise summary of "the objects, nature, and results of the investigations carried on by the Biological Survey," occupying about three pages, which is in turn followed by a classified, detailed statement of the practical work of the Survey, occupying the rest of the Report.

During the last session of Congress a bitter attack was made upon the Survey, obviously inspired by political animus, which led to a popular uprising throughout the country in its defense, which ultimately overwhelmed its maligners. The demand upon the Secretary of Agriculture for a report to Congress upon the work of the Survey was one of the fortunate results of a seemingly untoward incident; for while the country at large was keenly alive to its economic importance, many of the lawmakers of the nation were in blissful ignorance of its rôle in behalf of the public welfare. Now, however, there is no longer excuse for any such ignorance. Readers of 'The Auk,' and naturalists the country over, while well aware that the small sum annually expended in the niggardly maintenance of the Survey was many times repaid through its practical results, have now access to a comprehensive and convenient statement of its varied, far-reaching, and highly beneficial activities. It is impossible, nor is it necessary, to recapitulate here its various lines of work and their economic results, so fully unfolded in this official report, which fittingly concludes with a list of the publications of the Survey, from 1885,

¹ Report on Work of Biological Survey. By James Wilson, Secretary of Agriculture. Senate Document No. 132, 60th Congress, 1st Session. Read December 21, 1907; referred to the Committee on Agriculture and Forestry and ordered to be printed, with illustrations. 8vo. pp. 39, pll. i-vi (maps).

when the work was begun, to date. These include 'Bulletins' (Nos. 1-31), 'North American Fauna' (Nos. 1-26, excepting No. 6, not yet issued), 'Circulars' (Nos. 1-62), 'Farmers' Bulletins' (10 in number), and reprints of articles from the 'Yearbook' (29 in number).

A more popular review of the work of the Biological Survey has also recently appeared in the 'National Geographic Magazine,'¹ where Mr. H. W. Henshaw attractively presents the results and methods of its various lines of research. Especial reference is made to the relation of birds to agriculture, and the investigation made accurately to determine them; also the losses due to small mammal pests and to wolves; bird reservations and game refuges; protection of game and birds; supervision against the importation of undesirable and dangerous mammals and birds. No one can fail, on reading either of these documents, to realize, at least in some degree, the great economic importance to the entire nation of the work of the Biological Survey.—J. A. A.

CORRESPONDENCE.

The Buffel-head Duck.

EDITORS OF 'THE AUK':—

Dear Sirs:—In the current descriptions of the colors of the adult male Buffel-head Duck, there is, according to my own examination of specimens, an error as to the color of his belly. Audubon, Chapman, Saunders, Hoffman and Mrs. Bailey all *include this part* with the neck, breast and wing-coverts, simply stating that all these are *white*. Wilson, alone, always so exquisitely accurate in description, says: "...rest of the scapulars, lateral band along the wing, and whole breast, snowy white; belly, vent and tail-coverts *dusky white*" (the italics are mine).

This, as I have said above, agrees with my own examination of a small number of specimens procured in the New York market in winter, except that in my specimens the "*dusky white*" of the belly does not include the *vent, or adjacent tail-coverts*, both of these tracts being pure white, or very near it. In mine, too, the "*dusky white*" is too dark to be called any kind of white. It is a delicate real pattern of wood ash color, strongest along the sides and between the legs.

Yours very truly,

ABBOTT H. THAYER.

Monadnock, N. H.,
Jan. 28, 1908.

¹ The Policemen of the Air. By Henry Wetherbee Henshaw. National Geographic Magazine, Vol. XIX, No. 2, February, 1908, pp. 79-118, with 16 full-page half-tone illustrations and many others in the text.

NOTES AND NEWS.

DR. RUDOLPH BLASIUS, a Corresponding Fellow of the American Ornithologists' Union, died at his home in Braunschweig, Germany, September 21, 1907, in the 65th year of his age. He was born at Braunschweig, November 25, 1842, and was the eldest son of Johann Heinrich Blasius, the well-known author of the 'Fauna der Wirbelthiere Deutschlands' (1857), a leading authority on European ornithology, and Professor of Zoölogy in the Collegium Carolinum, the Technical High School of Braunschweig. Rudolf here received his preliminary education, and subsequently took his degree of M. D. at the University of Göttingen, in 1866. He entered the army as Assistant Surgeon in the war of 1866, and later, during the Franco-Prussian war, was promoted to Surgeon-Major. In 1879 he became Professor of Hygiene and Bacteriology in the Technical High School of his native city, which position he occupied till his death; and he also filled important offices in the municipal government.

He is said to have inherited a strong love for natural history pursuits from both his father and grandfather, and by the former was early trained in zoölogical research. Despite his many pressing duties later in life, he was able to continue active work in ornithology. He was for many years president of the Permanent International Ornithological Committee, and of the Deutsche Ornithologische Gesellschaft, and was one of the editors of 'Ornis.' He travelled much on the continent of Europe, being often a delegate to medical and ornithological Congresses, and thus became well acquainted with the ornithologists and the ornithological collections of the principal cities of Europe. His ornithological papers were quite numerous, relating mainly to the European ornithology; his earliest paper, published in 1862, being on the birds of Braunschweig, while his doctoral thesis (1866) was upon the structure of egg-shells. He was especially interested in bird migration, to which many of his papers relate.

He was a man of robust health until overtaken by his last illness, fond of field sports, a genial companion, and in his numerous travels made many lasting friendships.

MR. ROBERT RIDGWAY has recently started for a second visit to Costa Rica, where he expects to spend six months or more in ornithological explorations for the U. S. National Museum. As on his previous trip to that country, he will be the guest of his old friend, Sr. José C. Zeledon, who has done so much to develop the ornithology of Costa Rica. Leaving Washington January 27, Mr. Ridgway went via Tampa to Havana, where he met Mr. Zeledon, and the two proceeded to San José, arriving on the 8th of February. Two days later Mr. Ridgway wrote that he and Sr. Anastasio Alfaro, the genial and talented Director of the Museo Nacional, who accompanied him on several of his expeditions in 1905, were about to start on an excursion to Mount Turubales, on the Pacific slope, a peak

not hitherto visited by ornithologists. On later excursions they expect to visit the high grassy tableland in the central part of the country, and other little known regions.

The primary object of Mr. Ridgway's expedition is the collection of material for his 'Birds of North and Middle America,' the next volume of which will contain, among other families, the Formicariidæ, Dendrocolaptidæ, Furnariidæ, and Trochilidæ, of which a very large percentage of the Central American species occur in Costa Rica.—C. W. R.

ON February 28, C. William Beebe, Curator of Birds in the New York Zoölogical Society, and Mrs. Beebe, sailed on the steamship 'Korona' for Georgetown, British Guiana, for a trip to the headwaters of the Essequibo River, to study tropical bird life and obtain material for publication.

MR. FRANK M. CHAPMAN, Curator of Birds in the American Museum of Natural History, is visiting extreme southern Florida in quest of material for additional bird groups for the Museum, in which he has recently been promoted from Associate Curator to Curator.

A MANUAL of 'The Birds of Maine,' by Ora W. Knight, is announced for early publication. This work, which is devoted exclusively to Maine birds, will give "their relative abundance in each county," with descriptions of the different plumages of each species, and full accounts of their home life. Subscriptions, prior to April 15, 1908, will be \$3.00, and may be addressed to the author, 84 Forest Avenue, Bangor, Maine. Price, after this date, \$3.50.

AN "essay competition on comparative legislation for the protection of birds" has been inaugurated by the Royal Society for the Protection of Birds (London), which has issued a circular stating the regulations for the International competition for 1908. The Society's gold medal and 20 guineas are offered for the best essay or treatise on this subject. The essays, which may be written in either English, French, or German, should be sent to the Hon. Secretary, Frank E. Lemon, 3 Hanover Square, London, W., not later than December 31, 1908. Full particulars respecting the requirements of the competition may be obtained from the Hon. Secretary.

WITHERBY & Co., 326 High Holborn, London, announce 'The Vertebrate Fauna of North Wales,' by H. E. Forrest. This is one of the zoölogically most interesting, but hitherto neglected, parts of the British Islands. The work will form a large octavo volume of over 500 pages, with a colored map, portraits, plates depicting haunts, etc. It will be issued to subscribers at 12s. 6d. until the list reaches 500, when the price will be increased.

The same firm will also publish shortly an account, by M. J. Nicoll, of

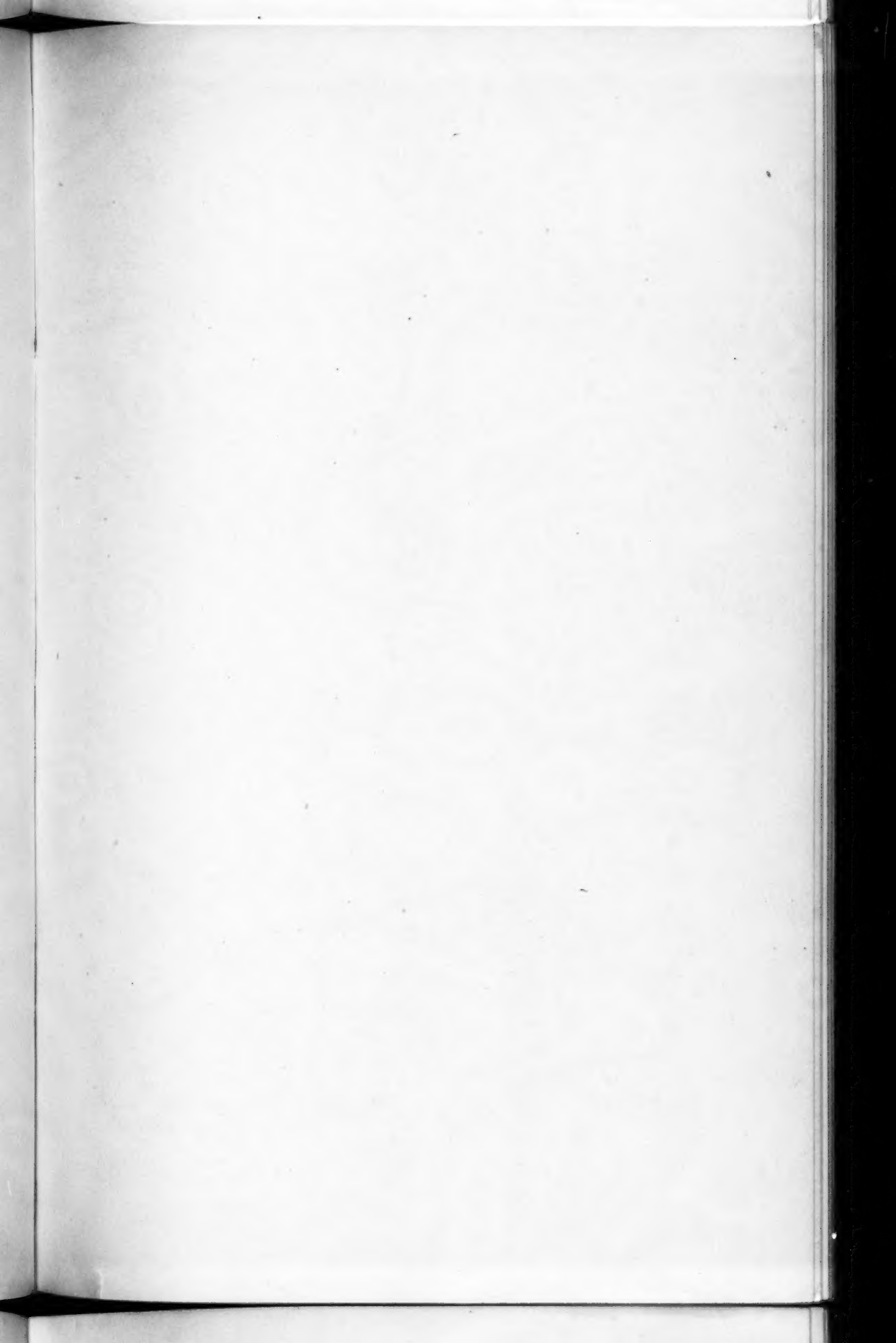
three long voyages on the Earl of Crawford's yacht 'Valhalla.' The author, a well-known ornithologist, describes the bird and animal life of many islands seldom or never before explored. The book will be fully illustrated from photographs of life and scenery.

THE eighteenth annual meeting of the Delaware Valley Ornithological Club was held at the Academy of Natural Sciences at Philadelphia, January 2, 1908. The Club was never in a more flourishing condition; the membership consists of 17 Active, 68 Associate, and 37 Corresponding Members, while the 'Migration Corps' numbers 63 observers.

The officers for the ensuing year are: Wm. A. Shryock, President; Stewardson Brown, Vice-President; Samuel Wright, Treasurer; and Chreswell J. Hunt, 225 N. 53rd St., Philadelphia, Secretary. Thos. D. Keim, 205 Radcliffe St., Bristol, Pa., is in charge of the migration work.

THE Academy of Natural Sciences of Philadelphia has just secured the Van de Pol Collection of East Indian birds, comprising about 1100 skins, from Java, Bangka, Batu Islands, Ternate, and the west coast of Sumatra. These, together with the specimens in the Tristram collection, and the Harrison and Hiller Sumatra collection, and the Porter collection from Luzon, received during the past few years, make the Academy's representation from this general region remarkably complete.

ERRATUM.—By an unfortunate lapsus, the 'erratum' on page 35 of this volume makes 'confusion worse confounded'! In Volume XXIV, plate xviii, fig. 1, accompanying Mr. A. C. Bent's paper on the 'Summer Birds of Southwestern Saskatchewan,' is wrongly indicated as 'Nests of Western Grebe'; the proper designation is 'Nests of California Gull.' The error, it is needless to say, is not the fault of the author, either on the plate or in the former erratum, but arose from a peculiar combination of circumstances, for which the editor is mainly responsible.





PINE HILLS AT KNOWLTON, MONTANA, WHERE GOLDEN EAGLES NEST.